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A
DESCRIPTION
OF
THE ARTERIES
OF THE
HUMAN BODY.

BY
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ROYAL COLLEGE OF PHYSICIANS, AND OF THE ROYAL
SOCIETY OF EDINBURGH, &c. &c.

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CORRECTED AND IMPROVED.

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TO

THOMAS THOMSON,

PROFESSOR OF CHEMISTRY IN THE UNIVERSITY OF GLASGOW,
M.D. F.R.S. L. & E. F.L.S. &c. &c.

DEAR SIR,

SINCE I dedicated to you
my former Work on the *Muscular Mo-
tions of the Human Body*, my opinion of
your worth, your learning, and abilities,
has remained unaltered. Actuated,
therefore, by the same motives which
influenced me then, I dedicate to you al-

so this *Description of the Arteries of the Human Body*. Whatever may be its merits or demerits, there are none better qualified than you to judge. With every sincere and ardent wish for your happiness in life, and your increasing reputation in science, already so great, I am, with esteem,

DEAR SIR,

Your affectionate Friend,

JOHN BARCLAY.

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TO
MY PUPILS.

GENTLEMEN,

I AM aware, that, on seeing this Description of the Arteries, many will naturally be disposed to ask, Why another Description of the Arteries? Why is it so short? Why is it so long? and, Why is it not accompanied with plates? To the first question, I have partly replied in my INTRODUCTION. In most authors who have treated of the Arteries, since the days of Haller, the description of some common variety, and often what he has depicted in his Figures, has usually been substituted for the description of the general character. The consequence has been, that the other varieties, such as he often describes in his notes, have been mentioned only, if mentioned at all, as *Lusus Natu-*

va, or as deviations from a general law, that has been supposed, but never deduced on the principles of induction, by any extensive or patient inquiry into the modes in which nature diversifies the Arterial System.

The second question admits of an answer in a few words. Instead of describing the indefinite varieties that distinguish individuals, I have endeavoured, from various preparations, and the descriptions of various authors, to ascertain the general range allowed to each of the Larger Arteries, as to their origin, their ramification, and extent of distribution.

To the third question, the reply is very nearly as short. The whole Treatise is by no means occupied with the description. Wherever I have deviated from the accounts usually given, I have felt as if bound, in justice and candour, to assign my reasons, and to quote authorities, such as the scrupulous and inquisitive reader might naturally demand, the intelligent reader naturally expect, and which only the thoughtless and the indifferent would have dispensed with.

The fourth question demands an answer not only to arguments, but even to strong and to early prejudices, and yet notwithstanding is so vague in itself, that it points to no definite object. To what

kind of plates does it refer? I mean not as to size, elegance, or accuracy, but to mode of expression. In what manner are they to convey an idea of the general characters of Arteries? Plates representing all the diversities of ramification, from which the general character is deduced, would be a work of labour and expence far beyond what any individual could reasonably attempt, the generality be inclined to purchase, the indolent to study, or the rational to approve. Plates, again, to supply the place of general inferences, condensing all the particular diversities of ramification into one form, and that form distinctly including all the diversities of ramification, are neither in the power of fancy to conceive, nor of art to execute. The plates, to which the question alludes, must then be the figures of some particular ramifications, or mixtures of particular ramifications, to assist the reader in forming a general idea of the rest. This is the character of the elegant plates published by Haller, which, from a belief of what is impossible, have usually been thought to represent his general conclusions.

As pictures of individual objects, they certainly convey more lively impressions than verbal descriptions. To comprehend them requires less time, and a less degree of mental exertion. From the impressions which they happen to make, they are ea-

sily remembered ; and, if they attract by their novelty or beauty, may induce many to think of the subjects to which they relate, who would not otherwise have bestowed a thought on them. Children, in this way, are tempted to read for the sake of the pictures ; and even the old, from early habits, or a natural bias for external shew, are often induced to purchase books at extravagant prices, on account of their engravings, their rich illuminations, and their brilliant colourings. It is true, likewise, that accurate figures and verbal descriptions contribute mutually to throw light upon one another, and not unfrequently assist the reader in forming more clear and precise ideas of the meaning of the author. Pictures, therefore, when accurately executed, in books of Pathology or Natural History, where the objects described are such as the reader never has seen, and never may see, are certainly attended with considerable advantage ; and particularly where the author is obscure, or where the power of conception in the reader is, from an original or acquired defect, either feeble or tardy, or hasty and unguarded in its operations.

With respect to the pictures representing parts of the Human Body, the case is different ; the Student of Anatomy has more frequently an opportunity of seeing the parts, and even of purchasing them at a

less expense, than he has of seeing or of purchasing their pictures in the splendid works of Bidloo, Cowper, Albinus, Haller, Cheselden, Sue, Walther, Mascagni, Scarpa, or D'Azyr. It is true that, from these and other engravings of distinguished celebrity, numerous copies of inferior size, execution and price, and partly copies, and partly not, to conceal the plagiarisms (*a*), have frequently been published, and frequently been thought equally useful. Among these some, with a few original figures, have been delineated by Anatomists themselves, who in that case cannot be supposed to feel much interest in bringing into view, or in commending any thing greatly superior to their own. From these causes, as well as from the price (*b*), the splendid engra-

(*a*) “ Hinc factum ut scioli multi et sophistæ, aliorum inventa expilantes, eadem passim (ordine solummodo verbisque immutatis, paucisque nullius momenti adjectis) pro suis audacter venditent; philosophiamque, quam certam et perspicuam esse oportuit, obscuram intricatam et confusam reddant.”—*Harveius, Præfat. ad Exercit. de Generat. Animalium*.

(*b*) The high price of elegant engravings is the usual pretence for publishing those of inferior value. In this pretence, the Anatomist is supposed to have little taste for the fine arts, to be either needy or meanly parsimonious, and yet not so fettered the one way or the other, as to refuse a little of his money for figures accommodated to his wants, if poor, or his niggardliness, if sordid. He is not, indeed, openly discouraged from having recourse to the structure itself, which these figures are meant to represent,

vings that reflected honour upon the judgment and superintendence of former Anatomists, and upon the skill and dexterity of the artists whom they employed, are seldom to be met with. The improvement of taste has not only been retarded, but the taste itself so degraded and corrupted, that a rude figure, embellished with colours in the style of a map, is calculated to afford it as much pleasure, as the taste which is cultivated derives from the works of the first masters.

I have hitherto proceeded on the supposition, that these figures, though not always elegant, are in general correct ; and yet it is known that the number of incorrect figures is immense ; and that Haller, who often cautions his reader against the erroneous figures of others, has cautioned him also against some of his own, deficient not only in elegance, but in truth (c). The reason why he afterwards published them has not yet been assigned ; but the artist who can accurately copy nature is not easily

but is confidently assured, that, by the assistance of such figures, he will greatly facilitate the progress of his studies *at a small expense* ; a hint which, if taken, must be gratifying at least to the author and bookseller, whether advantageous to him or not.

(c) *Tab. 111. Fascic. IV.* “ Hæc icon minus placet et supplebitur in Arteriis Femoris. *Tab. V; Fascic. V.* Hæc icon minus nitida, aliqua etiam vitiosa habet.”

found, his errors, if committed, not easily corrected, nor indeed, we must allow, easily acknowledged, if he happens to be the Anatomist himself. From the difficulty of striking an accurate resemblance; from the trouble and uncertainty of the effect in attempting a correction; or the trouble and expense of a new figure with no better hopes, many splendid figures, in both Anatomy and Natural History, though known to be false representations, have been given to the public; have grossly imposed on the credulous and ignorant; and been more frequently a source of error and of misconception, than verbal descriptions, which, if seen to be erroneous, can be easily altered. To the ignorant, indolent, or the indifferent, the beauty of the figure may sometimes compensate for the want of truth; but to the genuine admirer of nature nothing ever can. It is therefore, that Fabricius the Entomologist, in alluding to some figures of insects, exclaims in indignation, "Cursed be the memories of Hill and Renard, who have given us fictitious insects for real (*d*)!"

The fact is, that, though many elegant and splendid figures have already been published in Botany

(*d*) "Systematici veri pauci, observatores plures, at Ichniographi plurimi, splendidissimi; damnandæ vero memoriæ " John Hill et Louis Renard, qui insecta ficta proposuere."

and Zoology, yet very few genuine naturalists have either received, or communicated much important information through such channels; they have generally preferred, independent of any consideration of expense, concise descriptions, written in appropriate technical language, and have found them of more practical use as vehicles of science, than the most superb imitations of the pencil. The reason may have been, that the imitations are merely the pictures of certain individuals, but the short descriptions, in technical language, the definitions of a genus or a species: The first imply merely the art of delineating forms, and an acquaintance with the individuals that are represented; the second, a knowledge of a species or genus, a patient comparison of many individuals, much minute and repeated observation, soundness of judgment, the power of discriminating and of generalizing, and the art of reasoning on the principles of induction; the first, a task of easy accomplishment, of short duration, and of talents that are common, or that may be acquired; the second, a task of difficult accomplishment, of much trouble, of tedious duration, and of a combination of talents that is rare. It has therefore been observed, that, in Natural History, the

real systematic writers are few, the observers many, but the Inchniographists in vast numbers (e).

The delineations which approach nearest in point of utility to generic and specific descriptions, are those which represent the form, the number, and positions of the characters which are made to distinguish *genera* and *species*, and which in general require only but a very moderate knowledge of the pencil. Naturalists, in depicting these characters, either of the *genera* belonging to an *order*, or of the *species* belonging to a *genus*, regularly depict the characters of each, and leave not the reader, from the observation of a single instance, to form a conjectural idea of the rest.

In describing the Anatomy of the Human Body, the practice is different: we have no occasion for either generic or specific distinctions, unless where we mean to institute comparisons; we have only to describe a specific structure, and the prominent varieties which its several organs occasionally exhibit. In depicting these, it has been usual, for the reasons assigned, to depict only one of the varieties, generally, the most common, and to notice the others, if noticed at all, in verbal description. Anatomical plates, therefore, representing one of the common

(e) See the preceding Note.

varieties of an organ, should, if properly understood, be only an incitement to study the rest. The absurd but too prevalent notion, that these are expressive of certain generic or specific characters ; that they supersede the necessity of reading, or of examining the organs themselves in all their varieties, has induced a degree of indifference and supineness, that has been injurious to the progress of Anatomy.

Even the splendid Anatomical plates of Albinus and Haller, have, from this cause, instead of promoting, rather retarded the spirit of inquiry, and withdrawn the attention from the study and pursuit of general truths, to which science aspires, to the contemplation of particular facts from which it commences (*f*). The plates of Albinus instead of inducing the Anatomist to read his work *De Scelecto Humano*, and his work entitled *Historia Musculorum*, have been the means of suffering them to fall into almost total neglect and oblivion. Little surely did Albinus imagine, that, after publishing his *Historia Musculorum*, the attachment of the Obliquus

(*f*) “ Ex sensu permanet sensatum ; ex permanentia sensati
“ fit memoria ; ex multiplici memoria, experientia ; ab ex-
“ perientia, ratio universalis, definitiones, et maxima, sive axio-
“ mata communia, cognitionis certissima principia.”—*Harveius*,
Prefat. ad Exercit. de Generat. Animalium.

Externus to the Spine of the Pubis (*g*), or the compression of the Urethra, by the muscles called *Compressores Prostatæ*, would have ever been considered as the discoveries of later times ; and less surely might Haller have imagined, when he combated the opinion that the high division of the Humeral Artery was not the most common, that his learned annotations would have been forgotten, and his plates quoted, not half a century after his death, to prove he was ignorant of the very division of which he had collected so various proofs, of which he had seen, and of which he had examined such a number of cases to ascertain, on the principles of induction, whether it or the one which he has depicted was the most common.

This fondness for the plates, and reluctance to the labour of studying the works, which the plates were only intended to illustrate, presage nothing that is favourable to Anatomy. They indicate the decline of those energies, and of that enthusiasm, by which

(*g*) After describing one of the Tendons, by which the Obliquus attaches itself to the Os Pubis of the opposite side, he observes, that with the other “ *Se inserit tuberculo quod è superiore eademque priore parte Ossis Pubis eminet ; proximæ que Spinæ quæ ab ejus tuberculi latere externo est.*” This last attachment is now denominated the Ligament of Gimbernat, as if it had been unknown before.

its boundaries were originally extended ; they imply that Anatomists are beginning to dislike the *smell of the lamp* (*h*) ; that they feel not the pleasure, which they ought to feel, in the actual inspection of the objects themselves (*i*) ; that they seldom persevere until they are fatigued, or rejoice at being fatigued in such a cause (*k*) ; and that they are appalled at the labour and toil which are absolutely necessary for the successful prosecution of science (*l*).

(*h*) “ Ego, qua potui diligentia, perquisivi et non parum olei “ et operæ perdididi, &c.”—*Harveius, Exercit. Prima ad J. Riolanum.*

(*i*) “ Ita est, inquit Harveius. Placuit mihi semper ipsorum “ animalium inspectio.”—*Dedicat. ad Exercit. de Generat. Animalium.*

(*k*) “ In tali profecto opere, non fatigari solum, sed etiam “ fatiscere suave est ; ubi indagandi fastidium ipsa intuendi “ voluptate abunde compensatur. Solemus, rerum novarum “ cupidi, procul in ignotas terras excurrere, ut audita ab aliis ipsi- “ met propriis oculis intueamur : ubi tamen plerumque

———*Minuit præsentia famam.*

“ Pudeat itaque, in hoc naturæ campo tam spaciioso tam ad- “ mirabili, promissisque majora semper persolvente, aliorum “ scriptis credere ; incerta inde problemata cudere ; et spinosas “ captiosasque disputatiunculas nectre. Natura ipsa adeunda “ est ; et scimita, quam nobis monstrat, insistendum : ita enim “ dum oculos nostros consulimus, et a minimis exorsi ad ma- “ jora promovemus pedem, ad intima tandem ipsius arcana pe- “ netrabimus.”—*Harveius, Prefat. ad Exercit. de Generat. Animalium.*

(*l*) “ Nec est, cur jure quempiam labor deterreat ; si modo

It were fortunate indeed, if those who declined these necessary labours, did not aspire to the honours and rewards that properly belong to them ; such a paltry and unprincipled ambition, animated seldom even with a spark of generous emulation, but often inflamed with the basest rancour, jealousy, and envy, was what raised the hosts of opponents to blast the reputations, and vilify the labours not only of Harvey, but Linnæus and Haller.

Harvey's opponents treated his discovery as a silly bantling unworthy of the light, accused himself of affectation, vanity, and trifling, for opening animals while they were alive ; wantonly reproached him for dissecting frogs, serpents, and flies ; sneered at him often in contemptuous derision, and, in the

“ secum animo, reputaverit, hoc ipsum, quod vivimus, ab inde-
 “ fatigabili cordis nostri agitatione proficisci. Neque profecto
 “ tam desertum et solitarium hoc iter foret, nisi more, aut vitio
 “ potius, seculi in quo degimus, *plurimi ad ignaviam proclives*,
 “ mallent cum turba errare, quam cum laboris aerisque im-
 “ pendio privatim sapere : cum tamen veteres philosophi (quo-
 “ rum nos etiam laudamus industriam) contrarium prorsus iter
 “ institerint ; atque *indefessis laboribus* varia rerum experi-
 “ menta inquirentes, haud dubiam lucem studiis nostris prae-
 “ tulerint. Eorum tamen inventis dum acquiescimus, credim-
 “ usque (*quæ nostra est socordia*) nihil ulterius reperiri posse ;
 “ vivida ingenii acies languescit, et lampada, quam nobis tra-
 “ diderunt, exstinguimus.”—*Harveius, Prefat. ad Exercit. de*
Generatione Animalium.

more violent paroxysms of their rage, refrained not from cursing him (*m*).

The opponents of Linnæus, to excite a popular clamour against him, represented his system as infamously voluptuous, and subversive of the principles of morals and religion; while one Siegesbeck (*n*), a vain, ignorant, but popular declaimer, shifting his side, and renouncing the friendship which he formerly professed, was, through the influence of Lawrence Heister, appointed Botanical Professor at St. Petersburg, on purpose to rail at him; and,

(*m*) “ Tenellum adhuc infantem conviliis lacerant tanquam luce indignum—Sunt qui me inancem vivarum dissectionum gloriam affectasse clamitant; et ranas, serpentes muscas, aliaque viliora animalia in scenam adducta, levitate puerili vituperant, et irrident, nec a maledictis abstinere.”—*Exercit. Altera ad Riolanum*.

(*n*) “ This man’s celebrity,” says Stoecker, the biographer of Linnæus, “ turned to his shame; and his insignificant name was only kept in remembrance, owing to the greatness of the genius whom he so much strove to lessen. His conduct as an opponent was the more impudent, as he was himself destitute of that knowledge, which might have made him a competent judge of learning. The celebrated GMELIN, who lived at the same time at St. Petersburg, delineates his character in these words: ‘ Siegesbeck has scarcely a superficial knowledge of Botany; he understands the writings of others as little as he knows himself; he is contented with the bare names of plants suggested to him by his sterile brain; destitute of all penetration.’”—*Stoecker’s Life of Linnæus, translated by Trapp, § vi.*

it is acknowledged by Linnæus himself, railed so successfully, that he once was brought into such a state of poverty and contempt, by scurrilous abuse, that he seriously had resolved to bid adieu to Botany for ever (o).

The fate of Haller, in some respects was not much better: Equally zealous, and equally industrious as the other two, in promoting the real interests of science, he was ranked, he informs us, amongst the most wretched scribblers of his time, and seldom did a year pass over his head, in which he was not grossly insulted in some scurrilously malicious pamphlets (p).

These distinguished ornaments of science encoun-

:9

(o) “Sedem fixi Holmiæ, irrisus ab omnibus ab meam Botanice quot insomnes noctes et laboriosas horas transegerim; nullus dixit; quam vero a *Siegesbeckio* eram annihilatus, omnes uno ore acclamabant.—Heu! dixi, dat *Æsculapius bona omnia, Flora vero solos Siegesbeckios*; interdixi *Floram*; quæ collegi adversaria, æterno pulvere sepelienda millies decrevi.”—*Linnei, Epist. ad Hallerum, vol. i. p. 415.* and *Stoever's Life of Linnæus, § vi.*

(p) “Vides æque Lector me depressum fuisse, vexatum, numeratum cum miserrimis scriptoribus. *Præfat. ad Element. Physiol. vol. iv.* Ea est mea fortuna, ut cum omnibus eruditis cupiam bene, eorumque famæ studeam.—Ut tamen acerbos et contumeliosos in me libellos fere quotannis videam prodire de Prælo.”—*Ibid, Præfat. ad vol. v.*

tered difficulties, and surmounted hardships, which can fall only to the lot of a few. Unlike their sluggish, but envious opponents, they were not content with hearsay reports, or the pictures of the objects which they wished to examine; they regularly examined the objects themselves, where they had opportunities, and, to obtain these opportunities, grudged neither time, labour, nor expense. The progress which they made in many rugged paths untrodden before, and which they have described, to facilitate the progress of those who might follow them, is an evident proof, that we have not so much reason to dread the difficulties from without, as the want of spirit and energy within.—That you, Gentlemen, may feel a portion of their generous ardour, and acquire that accurate knowledge of Anatomy, which shall prove in the end creditable to yourselves, and beneficial, as it naturally must do, to your profession, is the earnest wish of

Your sincere Friend,

JOHN BARCLAY.

INTRODUCTION.

IN most animals there are two distinct classes of organs, which, from the peculiar nature of their functions, require always to be branched or ramified: The organs through which the fluids are circulated; and the organs by which the vital Energy is diffused. The first class is divided into Arteries, Veins, and Absorbents, and each division being dignified in Anatomy, with the name of System, we have thus four ramified Systems in the human body,—the Arterial, the Venous, the Absorbent, and the Nervous.

The Arterial system consists of the vessels which convey the blood from the ventricles of the heart; the Venous, of the vessels which return the red part; the Absorbent, of the vessels which return the colourless part, which convey back the decayed portions of the several organs, and which, by opening from the surface without, or from the alimentary within, receive all the nourishment that enters

the body, and transmit it through the medium of veins to the heart. The Nervous system consists of the Cerebrum, the Cerebellum, the Medulla oblongata, the Spinal marrow, and their ramifications, which ramifications are the only parts of this system strictly called nerves.

The larger branches of all these Systems are called Trunks, when viewed in relation to their own particular ramifications; a sort of language which, although incorrect, creates no confusion. The principal Trunks of the arteries are two; one commencing at each ventricle of the heart. The one commencing at the right or pulmonic ventricle, is named the Pulmonic Artery, from being ramified through the *Pulmones* or lungs. It receives the blood upon its return from all different parts of the body, and which is then generally of a dark and livid colour, but on being exposed to the action of the air, in its passage through the lungs, assumes a colour that is florid red. The other, commencing at the left or systemic ventricle, is named the Aorta or Systemic Artery. It receives through the course of its auricle and ventricle the florid blood returning from the numerous veins of the lungs, and afterwards transmits it, through the medium of its branches, to the system at large.

Both trunks are furnished with valves at their commencement, to prevent the reflux of the blood into the ventricles. In each the number of valves is three, their form semilunar, and the only valves to be found in the whole arterial system.

In all the arteries, the blood flows from the trunks to the branches ; but in the veins, from the branches to the trunks (*a*).

The venous trunks, by which the blood upon its return enters the auricles, are seven in number. Those receiving blood from the branches of the pulmonic artery, terminate in four, which are without names. Those receiving blood from the branches of the Aorta or systemic artery, terminate in three, the *cava superior*, the *cava inferior*, and *coronary vein*.

Prior to the time of Harvey, all the blood-vessels connected with the right or pulmonic ventricle were considered as veins, and hence, in those days, the pulmonic artery was called the Vena Arteriosa, or

(*a*) The Vena Portæ is the only exception. This singular vein is ramified at both extremities. By the branches of one extremity it collects the blood from the stomach, spleen, pancreas, and intestines ; and by the branches of the opposite extremity distributes it through the liver.

Arteria Venosa. In the same way, all the vessels connected with the left or systemic ventricle were considered as arteries; and hence the pulmonary or systemic veins were regularly termed *Arteriæ Venosæ*, or *Venæ Arteriosæ*. These opinions gave rise to the expressions venous and arterial blood; the dark-coloured blood being confined to what were called veins, and the florid to what were named arteries. After Harvey, however, had satisfactorily proved that the *Vena arteriosa* was actually an artery, and the *Arteriæ venosæ* actually veins in form and in function, it was obstinate and absurd, as De Back observes in his letter to Harvey, to call that Venous blood which flowed in arteries as well as in veins, or that Arterial blood which flowed in veins as well as in arteries.

To accommodate our language to the immortal discovery of Harvey, I have proposed, in my Nomenclature, to call the blood of the dark colour the Pulmonic Blood, as it all flows towards the *pulmones* or lungs, and the blood of a florid red the Systemic Blood, as it all flows to the system at large.

The Pulmonic system of sanguiferous vessels will therefore consist of the veins and arteries that convey the dark-coloured blood to the lungs: the Systemic system, of the veins and arteries that con-

vey the florid blood from the lungs to the system at large.

In this way, the pulmonic blood will, in one respect, signify precisely what the ancients meant by the Venous blood, and the systemic blood, precisely what they meant by Arterial blood, without involving the gross absurdity of calling that venous which flows in arteries, or that arterial which flows in veins (*a*).

(*a*) The obstinacy with which this language is retained in works of Anatomy, is now merely the effect of habit, but a habit continued in defiance of reason, and of common sense, and a habit, that is partly a consequence of that envy, which yielded so reluctantly to the clear and irresistible demonstrations of Harvey. An envy which, though compelled to be silent, has yet left behind it so discolouring a stain, that the merit of Harvey, to its full extent, is seen but obscurely in the present day, and by some Anatomists, as the late Dr. Hunter, scarcely seen at all. It should therefore be known, that the merit of Harvey did not consist in stumbling accidentally on any new facts, that necessarily forced him to see the circulation. In making his discovery, he was placed exactly in the same situation with hundreds before, and hundreds in his time: the facts, on which he established his conclusion, were facts generally known and admitted; facts that were seen, and facts that were examined by a great many others, some a century, and some even twenty centuries before. The valvulæ tricuspidæ and valvulæ mitrales, placed at the orifices of the two ventricles, and the valvulæ semilunares, or sigmoides, at

If all the blood flowing in the arteries were to return directly by the veins, and never to leave these circulating vessels, nothing would remain to

the commencement of the two great arteries, were known to Galen and to Erasistratus, nay, are even mentioned, and obscurely described in that Treatise concerning the Heart, which, though erroneously, says Galen, ascribed to Hippocrates, is yet published in his works.

The valves in the veins of the extremities were seen and described by Jacobus Sylvius, were also described by Charles Stephans, under the name of *Apophyses Venarum*, and were afterwards seen, and more accurately described by the celebrated Fabricius of Aquapendente, under the name of *Ostiola Venarum*. But though all saw that these membranes might often retard, and sometimes arrest the current of the blood, yet no one ever drew the conclusion that they could actually shut up its channels, and thus compel it always to flow in the same direction in the same vessels.

The blood too, long before the period of Harvey, had been thought to pass through the vessels of the lungs from the right to the left ventricle of the heart, and this passage was conjectured by Galen, by Servetus a Spaniard, by Realdus Columbus, and by Andrew Cæsalpinus. Nay, Andrew Cæsalpinus had not only traced it from the right to the left ventricle of the heart, but from the left to the right again, and yet he saw nothing of the circulation discovered by Harvey. With him, the blood was still made to flow backwards and forwards in the same vessels, from trunks to branches, and from branches to trunks again, like the tides of Euripus, between Attica and Eubœa.

nourish the system, to supply fluids for the glandular secretions, or to lubricate, when necessary, the different membranes, and the organs that are

Besides these facts, Harvey enumerated a great many others that were equally known to his predecessors and his contemporaries; facts, which, had they been accurately examined by a vigorous, penetrating, and reflecting mind, superior to prejudice, might, by a natural process of reasoning, have led to the discovery. But a mind of that description was wanting: those minds that happened to observe them were feeble, unsteady, and fettered by hypotheses, and every new fact received an explanation suited to the prejudices which they had imbibed.

The facts therefore, which were previously known, and previously explained on false hypotheses, were so far from being an assistance to Harvey in making his discovery, that they had all been previously enlisted to support the doctrine of natural, animal, and vital spirits; a doctrine which required two kinds of blood, one from each ventricle of the heart, and which were to meet in the cavities of the Cranium, Thorax, and Abdomen, and then to return, by the way that they went, back to the heart, for a new supply of what was necessary to continue the formation of the three spirits; which three spirits were three imaginary instruments of Galen, under the direction of the three Faculties, which he had substituted for the three Souls of Plato.

These three spirits, and the two kinds of blood, implied ideas that were incompatible with Harvey's idea of the circulation. Yet these ideas, prepossessing the judgment, destroying candour, and creating prejudices, prevented them from seeing, or readily admitting any kind of truths that were contrary to their own favourite conceits. On the other

lodged in the different cavities. And if the nutritious part of the aliment should every day be entering into vessels from which there was no possible

hand, the mind of Harvey, vigorous and sound, persevering and steady, was not to be shaken by the fashions of the day, by great names, or brilliant hypotheses. He was too penetrating, and had too much discernment, to be deceived by the shades and colourings that imposed upon others. From the facts that were generally known and admitted, but facts misapplied, he proved, in the clearest and most forcible manner, that the blood could not flow backwards and forwards in the same vessels; that it must necessarily have a circular course, and that the membranes, situated at the orifices of the two ventricles, at the commencement of the two great arteries, and these occurring in the course of the veins, would not admit of that species of flux and reflux which had been supposed. And that this idea was strikingly new to the world at the time, was but too evident, from the general surprize which it occasioned, from the general envy which it excited, from the many endeavours that were made to refute it, and when the truth was found irresistible, from the shameless attempts to detract from its merit, and ascribe it to others.

From the use which Harvey made of his facts, and from the use that was made of them by others, it appears, that facts on subjects of philosophy may be compared to the individuals composing an army,—without a leader and without discipline, they never perform any memorable action, but under a Cæsar, an Hannibal, or a Scipio,—are the safeguard of nations, the source of revolutions, and the dread of empires. The same facts that were dormant and useless in the hands of others, or perverted to trifling conceits and hypotheses, were, under

egress, the vessels would proceed gradually extending in length and diameter, until they were ruptured. And yet the different parts of the system could not receive any additional increase of matter, nor even admit of any diminution where there was nothing to carry off the decayed parts.

Harvey, the formidable host that overturned all the pathological and all the physiological systems of the time. What a different man must he then have been from those, who, meanly yielding to the fashion, are still employing the nonsensical jargon of the very hypotheses which he had confuted ! Could they, I would ask, who so easily are carried down with the stream, after it is almost spent and exhausted—could they, at the time when it spread like a sea, and rushed like a torrent, have been able to have met and stemmed it like Harvey ?

The late Dr. Hunter has, rather invidiously, introduced him along with Copernicus and Columbus, to shew that his merit as a discoverer was comparatively low. But what did Copernicus, and what did Columbus ? Not in possession of more numerous facts than their cotemporaries, but endowed with nobler and more vigorous intellects, the one developed the intricate system of the heavenly bodies, and the other discovered an unheard-of Continent. Was it not exactly in the same way, by the exertions of superior intellect, that Harvey made his immortal discovery ? I know not what has happened in the world unscen ; but, if I may judge from the records of history, and the annals of fame, the spirit of Bacon, the spirits of Columbus, Copernicus, and Newton, have not been ashamed to associate with, and to welcome the congenial spirit of Harvey.

To have therefore a correct and enlarged idea of the vascular system, it ought to be known, that numerous millions of arterial branches, like those ramified on the Tunica conjunctiva, can only be seen when they are inflamed, and convey red globules; that millions of such arterial branches, instead of transmitting their fluids to the veins, terminate towards the surface of the skin, exhaling the vapour called perspirable matter; millions on the central aspect of the bronchi, the pulmonic vesicles, and the trachea, exhaling the vapour that is seen in the breath; millions on the central aspect of the alimentary canal, to lubricate that tube, to protect it against acrimonious matter, or to assist in the processes of digestion; millions on the central aspect of the shut cavities, to lubricate the membranes, facilitate motions, and prevent adhesions; millions in the glands, to supply the fluids for glandular secretions; and millions in all the different organs for supplying fluids, to be assimilated in growth and nutrition. Now, the fluids which they send to the shut cavities, the fluids that remain after the supply of the glandular secretions, all the decayed parts of the organs, and the fluids sent, but not assimilated in growth and nutrition, are returned by the vessels that are named Absorbents. These absorbents are a sub-

ordinate system of veins, and furnished with valves similar to those which are found in the veins.

Besides the places already enumerated, many commence towards the surface and in open cavities, while the whole, by reiterated unions of their branches, terminate generally in two trunks, the largest called the Thoracic Duct, which, receiving from branches (*a*) opening on the central aspect of the alimentary canal,

(*a*) These absorbents, denominated Lacteals, were seen by Herophilus and Erasistratus, and afterwards seen and their use pointed out by the modest Asellius; and as Asellius published his account of them several years before the death of Harvey, Dr. Hunter mentions it as a stain upon the character of Harvey, that he did not seem inclined to believe in their existence. The fact is, Harvey admitted the existence of the vessels that were seen by Asellius, but would not admit that in all cases there was regularly a set of chyloferous vessels distinct from the veins, until the existence of such vessels had been fully proved in all cases where chyle was conveyed from the intestines. Now, that proof had never been furnished in the time of Harvey, while his age and infirmity, and the want of Dr. Highmore as an assistant, deterred him from personal and laborious investigation. The very head and front of his offending, were, therefore, no more than that he was old, infirm, and without assistance, and could not yield his assent to a fact on either deficient or conjectural evidence. But granting that the evidence had then been complete, that such vessels regularly existed in all animals: on what pretence could Dr. Hunter afterwards boast, that he had been the first to establish the fact, and upon evidence more satisfactory than that of Asellius?

all the nutritious portion of the food (*a*) empties itself, along with the other, into one of the larger pulmonary veins, not far from the right or pulmonary auricle.

The ramifications of the nervous system are very different from the ramifications of any of the three vascular systems. Each half of both the Cerebrum and Cerebellum has a stalk or pedunculus; these pedunculi are called Crura; these crura unite in the cranium, and form a ganglion called Tuber Annulare. Between the ganglion and the large foramen, through which they pass from the cavity of the cranium, they are known by the name of Medulla Oblongata, and upon entering the vertebral column, are distinguished by the name of Spinal Marrow. Most of the nerves issue from the crura, after their union in the tuber annulare, and most of them are composed of a number of filaments, partly from one of the crura of the Cerebrum, and partly from one of the Cerebellum. A number of these filaments, enclosed in an envelope of cellular membrane, constitute a Nerve,

(*a*) As all living bodies, whether Plants or Animals, receive nourishment through the medium of Absorbents, opening on the surface or central aspect of the Alimentary Canal; these vessels, if they were classed according to their functions, ought to be divided into two kinds, into those which return the Circulating Fluids and decayed parts, and those which convey nourishment to the system.

and the branching of a nerve is little more than the separation of a single filament, or fasciculus of filaments, from the common envelope in which they are contained. Though we know various functions of the nerves, we know but little of the relations subsisting between their functions and structure. Much has been fancied, and much has been said, but little observed, and less demonstrated on this subject.

The ramifications of all these systems differ considerably from the ramifications of the vegetable kingdom. In every place the smaller branches of the same species unite and separate, separate and unite again, so that veins with veins, arteries with arteries, and nerves with nerves, are observed to form the appearances of networks, which are called *Plexuses*. Upon the whole, the ramifications of their larger branches are also more regular than those of plants, and for this reason, that they are all distributed through a system of a definite structure, and of definite functions ; a system, too, composed of parts of definite forms, proportional magnitudes, and of determinate relative positions. In the vegetable kingdom there is not the same cause for regularity, where the several branches are distinct plants, not like the mutually dependent parts of the same fabric, but like individuals living together in the same society, and deriving their nourishment from a common stock ;

but at the same time capable of living on a different stock, or of living detached, in any species of soil and climate where they can be regularly supplied with nourishment.

Yet, notwithstanding the greater regularity of all the larger ramifications in the animal kingdom, every individual exhibits many peculiar varieties in the smaller branches, and even in some of the larger branches, where parts are diseased, or where habits are formed of varied extensive and voluntary motions. Such varieties, in copying from nature, are often represented in Anatomical Engravings, and references, often made indiscriminately, to the varieties as well as to the regular ramifications. Nay, these Engravings, if works of celebrity, are often, along with their verbal descriptions, servilely copied, while the copies pass for originals with the young and unsuspicious, the conclusion is, that branchings described by so many Anatomists in different countries, and at different periods, must be branchings, if not universally present, at least very general among the species.

On this hypothesis, and with a persuasion that appearances observed, and with little variation in every individual, must be matters of importance, and among the essential characters of the species, the student proceeds to examine them with care,

and trying to remember them with their connections and relative situations, soon finds that his labours are vain, and desists from his task in a fit of despondency ;—nor need his despondency be a matter of wonder. The references to the plates of the arteries, by Haller, are not fewer than two thousand five hundred, while the referenees to the veins, were they described with equal minuteness, would amount to nearly double that number. Yet this is not all ; the branches of Absorbents in the twenty-seven plates of Mascagni, are more numerous than all the branches of arteries and veins that have ever yet been pictured in figures or described in words ; and one may judge what must be the number of nervous branches, figured and referred to in different engravings, when he is told, that two thousand references are made by Walter to the branches of only a part of the Nerves lying in the eavities of the thorax and abdomen, and at least three thousand six hundred, by Fiseher, to the branches of nerves in the saeral extremity.

It is true, that in these different Engravings, references are made oftener than once to the same branches, succeeding plates representing frequently a part of the preeeding ; but, with every allowance, and every fair and reasonable deduction, the branches referred to, are, in point of number, by far too many

for any human memory to recollect them. And if it be necessary for the student to remember them, that which is totally impossible is necessary. Fortunately it is neither necessary nor proper, the very attempt being equally repugnant to the principles of reason and common sense. Let him only compare, with these plates and descriptions, a few preparations where the vessels have been successfully injected, or the branchings of nerves minutely dissected; he shall see his preparations in the smaller branches differing widely, not only from the plates, but from one another; and shall see each preparation exhibiting branches and ramifications peculiar to itself, exhibiting many not referred to in the plates, and wanting many that are there honoured with obtrusive references and tedious descriptions. Such a comparison must soon convince him, that many branches and ramifications described by Anatomists, are the mere peculiarities of individuals, and yet these not a tenth, nor a twentieth part of what they might have talked of, had they descended to still smaller branches, nor one million of a thousand millions, had they taken the microscope, and tried to discover, enumerate, and describe the extreme branches that elude the sight of the naked eye.

But if once assured of the general fact, that all individuals hitherto examined, (and many thousands

have been examined,) presented varieties in their smaller branches ; may we not now fairly conclude, that every other individual of the species shall present varieties in a similar manner ; and after arriving at this general conclusion, need we be told that certain individuals, as A, B, C, have also had their share of varieties, and that would we only take patience to listen, such and such an Anatomist could prove it by his plates, his descriptions, and his preparations. That he certainly may do ; but requesting our patience in such a case, is, in other words, insulting our judgment, unless the varieties can clearly be proved to reflect some important light on Medicine, to direct the operations of Surgery, or establish some general fact in Physiology (*a*). If a Botanist

(*a*) In studying Anatomy, the object of the student is first to be acquainted with the general or common structure of the species ; and after acquiring this information, to know in general the modifications to which it is liable, from age, sex, habit, and circumstances. In entering, however, on professional duties, as Surgeon or Physician, the case will in some measure be reversed. Already acquainted with the general structure, and with its more general modifications, he now, with a patient under his care, must inquire minutely into what is peculiar in his constitution, what peculiar in his life and habits, peculiar in his symptoms, and peculiar also in their mode of combination ; and by these peculiarities in a great measure must regulate his practice ; it being obvious, that to practise successfully, he must know something more than the species of his patient, something

should draw a particular plant to furnish some general idea of its species, would he ever think of making references to all its peculiar branches and leaves, and accompany these references with verbal descriptions? If he did so, a pupil of Linnæus would naturally suppose him fatuous or insane, or at least a most egregious insignificant trifler.

So far as the difference of the cases will admit, might it not be worth the while of Anatomists to imitate the Naturalist in his mode of description. His objects of description in Botany and Zoology, are infinitely more numerous and varied than those of the Anatomist, and yet he describes them with so much precision, that we seldom mistake the object which he means, and with so much conciseness, that we easily remember it; and what is more, recognise the object when we see it in nature, although we had never seen

more than the species of the disease, and something more than the species of the remedies usually recommended. To attempt the cure upon general information, would be to mistake the individual for the species; and a person labouring under such a mistake, would be likely to do more harm than good. In studying, however, individual distinctions, much care and discretion are also requisite; for in such a pursuit, one may be apt to lose sight of the species, and, trusting to trifling unimportant distinctions, may regulate his practice by appearances and circumstances that have little connection with the species of the disease, or the species of his patient.

it before. On what principle is this singular art of description founded? Linnæus will inform us: Examining a number of individuals, he marked the characters that were uniform, permanent, and common to them all. Of these he selected the most obvious, for the purpose of being readily observed, and made them few, for the purpose of being easily remembered: These constituted the characters of his *Species*. Comparing again a number of species, he marked the characters that were permanent, uniform, and common to them: These constituted the characters of his *Génera*. Comparing the *Genera*, in the same way, he discovered the characters which distinguished the *Orders*; and comparing the *Orders*, the marks, and characters that distinguished his *Classes*. By these contrivances, the Naturalist can now readily determine the particular species to which a plant or animal belongs; and had, therefore, a botanist accompanied Kotzebue in his exile to Siberia, he, in two or three words, could have conveyed a precise idea of the species of the plant which that poet, after a description of fully two pages, has left undetermined.

In describing the four ramified systems, as occurring in man and the lower animals, under a great variety of forms, we perhaps, like the naturalist, might find it necessary to divide each into different Orders,

Genera, and Species (*a.*) But confining our views to the ramified systems of the human body, the characters which distinguish their different orders, genera, and species, fall not within the plan of our inquiry. We have merely to select the characters of the species from the varieties that distinguish individuals. Thus, in comparing the arterial branches and ramifications of many individuals, we have to examine all the appearances wherein they differ, and wherein they agree ; wherein they agree often, and wherein seldom ; to distinguish what are regular from what are variable, what are peculiar from what are general, and then to fix on the regular and general as the characters of the species : Noting at the same time the nature and frequency of the exceptions from the general rule, but omitting entirely the uncertain and unimportant varieties that distinguish individuals, and which never can be objects of any description that is applicable to the species.

But leaving as uncertain what is uncertain, and describing as regular only what is regular, we should greatly facilitate the progress of Anatomy, relieve our

(*a*) The rete mirabile of Galen, the rete mirabile of Hovius, the ramification of the humeral artery as in the Lemur, the ramifications of the mesenteric as in the Sow, and the ramifications of the renal as in the Cat, are properly generic ramifications.

descriptions from a great number of useless incumbrances, prevent trifles from mingling themselves with matters of importance, and give to our details a character of clearness, manliness, and interest, which they hitherto have not had.

Should it be objected to such descriptions, that they must necessarily be vague and imperfect ; the reply is, that they certainly must be so considered as descriptions of any individual, just as descriptions of any individual must be vague and imperfect descriptions of the species. But although the uniform characters of the species be more general than the varieties of the individual, it does not follow that the description of these general characters may not be fully as minute and accurate as that of the individual varieties (*a*)

The persons most likely to censure descriptions accommodated to the species, and not to the individual, will be the verbose, who, overcharged with a multitude of words, are impelled like Elihu, the friend

(*a*) It is much to be regretted that such distinctions are not oftener made, and that the fashion of describing individuals instead of the species, is scarcely a more common error in Anatomy, than the fashion in practice of prescribing for the species instead of the individual, who often swallows universal remedies recommended indiscriminately by impostors, to both sexes, and to all varieties of age, condition, previous habits, and idiosyncracies.

of Job, to speak merely that they may be refreshed : The men too of taste, fancy, and feeling, who talk of the *elegant, beautiful, and wonderful*, describing objects, not by their real and obvious characters, but by the emotions which they had excited : and lastly, the men who eagerly aspire at making discoveries, and, although extremely averse to labour, are fond of the character of deep research. To these, the varieties of each individual must present novelties that have not been explored, and although generally of a trifling nature, yet, when dressed out in fantastic solemnity, and a theory added to give them an importance, are sufficiently shewy to serve the temporary purposes of the day.

But if ever the varieties of individuals deserve attention, it is when they can be arranged into species, when they can be traced to general causes, and when they lead to general conclusions. For it is then, and not till then, that they become objects of Science, which consists entirely of general truths, and can never be promoted by facts and observations, but such as contribute to the establishment of general conclusions.

The appearances of the arteries, which I shall describe as general facts, or as common to the species, shall be those I have found, with a few exceptions, in all the individuals which I have examined during the course of many past years ; appearances also

which I have found in a great number of dried preparations, of which, besides those of my own collection, I have seen not a few ; and lastly, appearances, which, as I have learned from their writings, were also found in the individuals that were seen by Eustachius, Winslow, Lieutaud, Haller, Sabatier, Murray, Portal, Boyer, Bichât, Soemmerring, and others. What exceptions I have known from those general appearances, I shall mention, and among the number, those collected by my friend Mr. Allan Burns, of Glasgow, who, with a liberality which I never shall forget, has not only favoured me repeatedly with a sight of his valuable collection, but has generously offered to send me any preparation that I might wish to examine more minutely (*a*).

These exceptions (*b*) from a more general law, though occurring but once in a hundred times, have often a strong claim to our attention, and more particularly if occurring in places where they might occasionally affect the mode and the result of surgical operations. Thus for instance, if the Surgeon

(*a*) The above remains as in the edition of 1812, but now my lamented friend is no more.

(*b*) The intelligent reader need not be informed of the difference between an *exception* and a *variety*. As varieties were never meant to be comprehended under the general rule, they cannot be reckoned deviations or exceptions from it.

were aware that the Obturator artery had even but once arisen from the trunk of the Epigastric and surrounded the neck of the hernial sac, that the common Pudic had even but once descended by the side of the Prostate Gland, or that the left inferior Thyriod had even but once arisen by a common trunk with the right, and ascended obliquely across the Trachea, not able to foresee that these anomalies might not be present in the next patient on whom he was to operate, he certainly with such cases in view, would proceed more cautiously to make his incisions on the parts concerned, and be better prepared to meet any accident, should such arise from these irregularities in ramification.

From such irregularities, he might also be led to suppose that others of a similar nature might occasionally occur, and be thereby induced to enquire into the causes that affect the functions and the ramifications of this system of vessels. Of these causes some are known, some perhaps remain to be discovered, and some discovered to be further investigated.

Mental emotions, affecting the functions of every organ dependant on the nerves, affect also, and each in its own peculiar way, the functions of arteries, so as to vary not only the pulsations, but to change even suddenly the state of the

blood, (a) and sometimes are carried even so far as to end in madness ; and by powerfully determining the blood to the brain, to alter its structure.

Many arteries, which in their healthy and natural state, exclude the red Globules, admit them readily on attacks of inflammation, and again exclude them when the effects of inflammation are removed ; as may often be seen in cases of Ophthalmia.

The vessels of the Uterus gradually enlarge in diameter and length, in proportion as the period of pregnancy advances, and again contract in length and diameter after parturition.

In the healing of Wounds, Abscesses, and Ulcers, Arteries form new inosculation, and send out numbers of new branches.

Immediately after birth, the umbilical Arteries begin to diminish, and the external Iliacs to enlarge, till their former proportions are entirely reversed, while the Ductus Venosus, the Ductus Ar-

(a) See Hewson's Experiments on the Blood. As morbid structures are often the effect of long and habitual morbid actions, we may see the reason why symptoms of disease cannot always be traced to the changes of structure, and must learn to be cautious in pronouncing the appearances of morbid structure to have been the causes of the morbid action, seeing that the structure is often no more than the slow and gradual effect of the action, though by such an effect, the action certainly increases its influence, and is afterwards able to extend its ravages more rapidly through the system.

teriosus, the Umbilical vein, and Foramen Ovale, are gradually closed.

In short, the blood vessels, to a certain extent, accommodate themselves to changes of circumstances, enlarge, diminish, and even disappear according to the different exigencies of the case. This general truth, deduced from the facts that already have been mentioned, is farther confirmed by the states of the vessels in morbid structures, by the changes that follow aneurismal tumours, by the changes that follow the removal of these tumours in successful operations, and by the greater number of varieties to be seen in the parts which are naturally subjected to the greatest diversity of voluntary motion.

From this account we may partly see the cause why no Arteries have ever yet been named or characterized from the number of their branches, but always rather from some other circumstance; some deriving a name from their origin, as the *External* and *Internal Carotids*, and *Aortic Intercostals*; some from the organs on which they are ramified, as the *Hepatic*, the *Gastric*, the *Splenic*; some from their situation, as the *Humeral*, *Radial*, and *Ulnar*; some from the parts through which they pass, as the *Obturator*; some from their mode of passing, as the *Perforant*; some from the directions which they

take, as the *Recurrent*; some from the course of their direction, as the *Circumflex*; some from their course considered in relation to the parts on which they run, as the *Coronary*; some from their obvious inosculation, as the *Anastomotic*; and some even from a false hypothesis, as the *Aorta*, *Carotids*, and *Ranina*.

With the names of the Arteries, I shall take few liberties, except where they lead to ambiguity or error; or where a change would simplify and improve the language of description.

When they are named from their destination, or from the organs on which they are ramified, they and the organs, when the change can be made without much innovation, should always have their names from the same language. For instance, the names of the principal muscles attached to the tongue, have an allusion to its Greek name *Glossa*; while the name of the Artery has an allusion to its Latin name *Lingua*. It would have been better had the same epithet which distinguishes the muscles, and a pair of the nerves belonging to the tongue, been also made to distinguish the Artery.

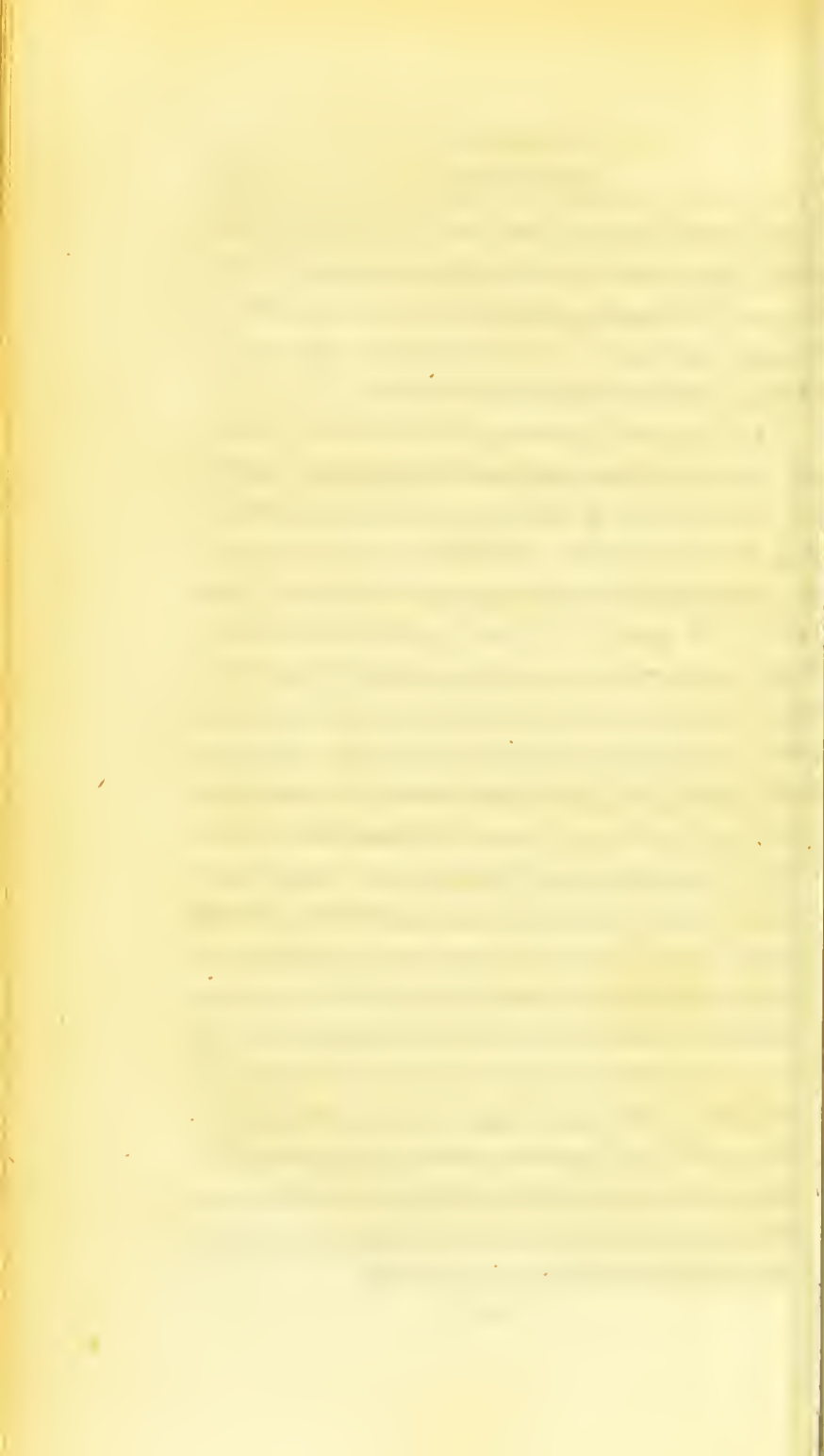
The parts of Arteries should never be described under separate heads, as if they were whole or entire Arteries; what we denominate the Subclavian, the Axillary, and the Humeral Arteries, are but different

parts of the same trunk ; and what we denominate the common Iliac, the external Iliac, the common Femoral, the superficial Femoral, the Popliteal, and Posterior Tibial, are different portions of another trunk. It is surely absurd that these different *parts* should each have a name, and yet that the *wholes* of which they are parts should be without names. Where it is expedient (and there are cases where it may be expedient,) to distinguish the parts by appropriate names, let them be distinguished by all means, but let them still be distinguished as parts, and not as wholes.

As Arteries in general are ramified on the parts adjacent to their course, the course of the Artery ought first to be described to its utmost extent, in order that the student (who is always supposed to be previously acquainted with the parts adjacent,) may form at once a tolerably accurate, though general idea of the several organs on which it is ramified. For these reasons, the continuation of the trunk of an Artery should always be carefully distinguished from its branches; a circumstance which, in the description of the Arteries, is frequently overlooked: Thus, the *Ranina* is properly a continuation of the Lingual Artery ; the Thyroid branch, a continuation of the Atlantal, or superior Thyroid ; the Infraorbital, a continuation of the trunk of the internal Maxillary ; and the Nasal branch, as it is

called, a continuation of the trunk of the Ophthalmic. Thus names are multiplied without necessity, and by not following the course of the trunk, so far as it goes, we cannot so readily form an idea of the parts adjacent on which it is ramified.

As all parts of the living body receive a regular supply of blood, suited to their functions, and as all blood flowing in the branches of the neighbouring Arteries, is either of the same, or very nearly of the same qualities, the origin of an Artery, from which the supply of blood is received, is of very little consequence to the organ; of so little, in fact, that the same organ is frequently supplied by branches proceeding from different trunks. For the sake, indeed, of surgical operations, it were to be wished, that the origins and ramifications of Arteries were more regular than they are. But the general law here prescribed by the Author of Nature, seems evidently this, that every part shall have a supply suited to its functions, from the nearest or most convenient sources, as circumstances will admit. And that if vessels from the usual sources be deficient or wanting, owing to disease, accident, habit, or primary formation, other vessels from different sources, and in different situations, shall always be in readiness to assume their office, and to furnish the supply of blood that is requisite.



A
DESCRIPTION
OF
THE ARTERIES.

THE AORTA,

OR

Systemic Artery.

THIS large Artery, ramified through every part of the system, rises from the left or Systemic Ventricle(*a*), nearly opposite to the *sacral* margin of the third Rib, then running behind the Pulmonic Artery, proceeds *dextrad*, *sternad*, *atlantad*, till nearly opposite to the *sacral* Margin of the first Rib. Here, suddenly changing its course, it bends *sinistrad* dor-

(*a*) In the fœtal state, as it always receives through the channel of the Ductus Arteriosus a very considerable portion of its blood from the other Ventricle, this communication with the two Ventricles, though with some variations in the form of the organs, has occasionally been observed in a few individuals several years after. See *Burns* on the Varieties of the larger Arteries.

sad, and *sacrad*, towards the third Vertebra of the Thorax. From this place, resting on the side of the Vertebral Column, a little to the left of the *Mesial Plane*(*b*), it advances to the Diaphragm, passes between the Crura of that muscle, enters the Abdomen, gradually inclining more towards the right, till it reaches the seat of the Mesial Plane, and at last, near the fifth of the Lumbar Vertebrae, divides equally into two large branches, that supply the Pelvis and Sacral extremities.

The part between the Ventricle, and where it first reaches the Vertebrae, has been named its *Arch*. From the Arch to the Diaphragm, it is called *Thoracic*(*c*), and from the Diaphragm to its division, *Abdominal Aorta*.

Its three Valves are at its commencement ; when they fall back from its centre to its sides, they cover three depressions, which have been named the *Sinuses of Morgagni*.

(*b*) In these singular cases, where the apex of the heart points to the right, the situation and course of this Artery, as to right and left, will be somewhat reversed.

(*c*) It is hard to conceive what kind of ideas floated in the brain, when the term 'Thoracic' was first employed to distinguish this part of the Aorta from its Arch: Both are equally in the cavity of the Thorax ; and if both do not equally furnish it with blood, yet both evidently furnish a share. The arched and the straight Thoracic Aorta, though not absolutely correct, would have certainly been a language more clear and distinct.

From the base of the Ventricle to the summit of the Arch, it is larger in diameter than at any other part of its course ; this portion has been named *the great Sinus of the Aorta*.

From the Arch issue the branches that supply the Heart, the Head, the Neck, the Atlantal extremities, and part of the Thorax. From the straight Thoracic portion, the branches that supply the remainder of the Thorax, and its Viscera ; and from the Abdominal, the branches that supply the Abdomen and its Viscera, the Sexual organs, and the Sacral extremities.

When it sends branches to parts that are situated in the Mesial Plane, or to parts whose attachments are in that Plane, or to parts that are single, the branches which it sends are usually single. But in all other cases, from the similarity of the two halves on each side of the Mesial Plane, it generally sends out branches in pairs, of which only one of the halves requires to be described.

BRANCHES FROM THE ARCH.

The Branches from the Arch are (*d*) the two CARDIAC Arteries ; the common trunk of the RIGHT

(*d*) The cases are rare where a Vertebral Artery, a Thyroid, a Thymic, a Pericardiac, or internal Mammary, arise from the Arch.

CEPHALIC, and the RIGHT BRACHIAL (*e*), usually called ARTERIA ANONYMA, or INNOMINATA; the LEFT CEPHALIC, and the LEFT BRACHIAL (*f*).

(*e*) The terms Cardiac and Cephalic are borrowed from Chaussier, and applied to the Arteries in allusion to the parts on which they are ramified: Cardiac expressing what belongs to the heart, and Cephalic what belongs to the head; *Carotis Communis*, the usual name for the Cephalic, being in allusion to a false hypothesis, suggests no idea of either its course or its destination.

The term Brachial naturally expresses what belongs to the *Brachium*, a word that denotes the Atlantal extremity, from the top of the Shoulder to the points of the Fingers. This term has sometimes been used to signify, merely, that portion of the Artery which lies on the Humerus, as the two terms, Subclavian and Axillary, signify the portions under the Clavicle and in the Axilla. But as it is proper that the whole should have a name, as well as the parts, I have chosen *Brachial* as a general epithet expressive of the organ through which it principally distributes its branches.

(*f*) Cuvier, in speaking of the Mammalia, (xxv Leçon, B.) says, you may find in the different animals of that class, examples nearly of all the kinds of ramification that Anatomists hitherto have found in Man. In some, the branches arising from the Arch, are similar to those of the human species. In others, the Aorta, immediately after leaving the Ventricle, divides into two, an ascending and descending Aorta, where the first afterwards separates into halves, that each half may send off the Brachial and Cephalic Arteries of its own side. In others, the right Brachial, and the two Cephalics, are observed to arise by a common trunk.

The Aorta in birds, which bends to the *right* immediately upon its leaving the Ventricle, gives out two branches, of which

the left always takes precedence in point of origin. These two branches, like the divisions of the ascending Aorta, also send off the Brachial and Cephalic branches of their own sides.

The Aorta, in Cuvier's Class of Reptilia, divides differently according to the Orders and Genera of the class. In some, the heart has two Auricles and two Ventricles, imperfectly divided. In others, marks of division disappear, and the heart has distinctly but one Auricle and one Ventricle. In some of the Orders where there are two, three Arteries issue from the heart, which would be very nearly the appearance that we see in some of the class of Mammalia, were the two Aortas to open by separate mouths from their Ventricle. In others, two Arteries issue from the heart, which approaches nearer to the appearance that we see in Man, and in those Mammalia that most nearly resemble him. In others, the Aorta, instead of the branches that send off the Arteries of the opposite sides, divides into two separate trunks, which afterwards unite.

The Aorta of the Ray proceeds from the Heart, directly Atlantad, sends off near its origin two lateral branches, and afterwards terminates in other two. These four branches are each divided into smaller branches, which, running along the Branchial Arches, and sending Ramuli to the parts which radiate from their convex side, transmit their blood to the branchial veins, which, by successive and reiterated sinews, form several trunks upon each side; and which, in their turn, by gradually converging to the mesial plane, at last terminate in a common trunk that runs along the sternal aspect of the vertebral column, and performs the office of an aorta. This last description is from a preparation that is now before me, and Cuvier, who describes the other Arteries of the Genus Ray, concludes with saying, "Telle est la distribution général des Artères dans la Raie. Elle est peu différente dans les autres Poissons, Leçon xxv, Art. I.

ARTERIÆ CARDIACÆ,

seu

Coronariae Cordis. (g)

These Arteries arise from the Aorta within the Pericardium, generally beyond the Sinuses of Morgagni ; the right runs *dextrad* between the Pulmonic Auricle and Ventricle, until it reaches the Cardiac Septum on the dorsal aspect, then changes its course, and accompanies the Septum as far as the Apex. The left runs *sinistrad* between the Systemic Auricle and Ventricle, till it reaches the Septum on the sternal aspect, there it sends off a branch, continuing the line of its first direction, but passes itself along the Septum, and inosculates with the right Cardiac at the Apex.

These two Arteries, by their numerous branches, supply the two Ventricles, the two Auricles, and the

(g) Three Cardiac Arteries are rare, and those cases where but one has occurred, though such have been mentioned by Galen and others, were never seen by Haller. I have lately seen a case, where the right Cardiac did not reach *dextrad* so far as the Septum, and where the circumflex branch of the left Cardiac, of an uncommonly large size, was observed going round to supply its place.

coats of the vessels within the Pericardium. Some of their branches are even reflected on the Pericardium, where they inosculate with small branches of what are called the internal *Mammaries*, and others accompanying the large vessels as far as the lungs, have been observed to inosculate with the *Bronchials*.

Their branches to the Auricles, the coats of the vessels, and the Pericardium, when compared with those that are ramified on the Ventricles, are extremely small.

Some exhalant branches opening into the Ventricles, and occasionally injected from communicating veins, as well as from their trunks, have sometimes been viewed as belonging to the Arteries, and sometimes again as belonging to the Veins. As belonging to the Arteries, they have been termed the Arteries of Vieussenius; as belonging to the Veins, the Veins of Thebesius. Sabatier never could observe these vessels. Portal saw them, and probably the success of tracing and injecting them, depends much upon the state of the heart and vessels at the time. Notwithstanding the facility with which Thebesius made his Probes to pass through them in a Bullock's heart, I doubt much, if they ever admitted red globules in the healthy and living state of that organ.

ARTERIA ANONYMA,

seu

Innominata.

THIS common trunk of the right Cephalic, and the right Brachial, rises near the summit of the Arch beyond the Pericardium, and divides nearly opposite to the Atlantal extremity of the Sternum (*h*).

(*h*) It has been observed on the Sternal aspect of the Trachea, extending Atlantad as far as the confines of the Thyroid Gland. See *Burns* on Varieties of the larger Arteries. The Cephalic and Brachial, to which it gives origin, sometimes arise from the Aorta, but then the form of the Arch is different, and its span more extended. In the usual form of the Arch, this common trunk becomes necessary to preserve an equality of the circulating fluids in the two sides. For supposing the Brachial and Cephalic branches of the same magnitudes, as when they arise from the common trunk, to rise separately from the Arch of the Aorta in its usual form, the one next the Ventricle, opening obliquely on the side of the current, would receive proportionally much less blood, than the one whose orifice is situated higher, and more directly opposed to its force.

The left Brachial and Cephalic, and the two Cephalics, have been seen originating by common trunks. See *Portal*. Soemmerring saw a case where two trunks only rose from the Arch, one sending off the two Cephalics, and the other the two Brachials.

The cases where the right Cephalic and Brachial arise from the Ventricle, and not from the Aorta, and the case of two Aortas, as in quadrupeds, where the one called ascending, sent off the Brachial and Cephalic Arteries, have repeatedly been

Portal, and several other Anatomists, are inclined to view it as the commencement of the right Brachial, and the more so, that it bends towards the Axilla, and gives out occasionally the Thymic, the Me-

mentioned, but not repeatedly observed. See *Portal*, Tableau Chronologique et Journal des Savans, 1668. Even the case mentioned by Walter, where the right Brachial, and the two Cephalics, arose together by a common trunk, although often seen in comparative Anatomy, (Cuvier, xxv Leçon, Art 1.) is rarely observed in the human species, although, from the close contiguity of the trunks it sometimes occurs. The case quoted by Soemmerring from Malcarne, where two Aortas arose from the Ventricle, and which were united after each had given out the Encephalic, the Periccephalic, and the Brachial Arteries of its own side, and the case quoted by Haller from Hommelius, where the Arch divided into two branches that afterwards united, and which left between them an annular-like space, for the passage of the Trachea and Œsophagus, the Sternal branch sending off the left Cephalic, and left Brachial, and the Dorsal branch, the corresponding Arteries of the opposite side, might rather be termed unnatural appearances, than exceptions from the usual ramifications. The case, however, mentioned by Hunauld, has a fairer title to the name of an exception, where the first branch arising from the Arch was the common trunk of the two Cephalics, then the left Brachial, and then the right, the last trunk being afterwards reflected to its own side, like that mentioned by Dr. Monro, jun. which returning dextrad between the Œsophagus and Trachea, might have been, he thinks, the cause of Dysphagia. With a similar origin the Right Brachial sometimes returns between the Œsophagus and Vertebral Column. See *Soem.*

Haller, remarking that all such cases are extremely rare, expresses a hope, that, after dissecting forty bodies, he may

diastinal, the Pericardiac, and the Diaphragmatic branches, that usually arise from the Brachial Artery.

ARTERIÆ CEPHALICÆ,

seu

Carotides Communes.

Of these two Arteries, the right is the shorter, and from the inclinations of the Aorta, situated more to the Sternal aspect. Both are always in the close vicinity of the Trachea, appearing first near one another on its Sternal aspect, but soon diverging *atlantad* and *dorsad* towards the seat of the Longi Colli, and Recti Capitis Interni Majores; here they run parallel along the sides of it and the Œsophagus, and soon after, when nearly opposite the Atlantal margin of the Thyroid Cartilage, separate each into two branches (*i*); the ENCEPHALIC ramified chiefly on the parts within

be allowed to obtain some credit for his assertion; and, indeed, Soemmerring, who describes here a number of exceptions from the general rule, has described but few from his own observation.

(*i*) In rare cases, the Cephalics send out anomalous branches before they divide; in other rare cases they divide sooner, and in cases still rarer divide not at all into Encephalic and Pericephalic; the branches ascribed to the Pericephalic arising separately, without any common trunk of their own. See *Burns's Varieties of the larger Arteries.*

the Cranium, and the PERICEPHALIC ramified chiefly on the parts without.

Through most of their course, they are found connected by Cellular membrane, with the Internal Jugular Veins seen on their Lateral and Sternal aspects, the eight pair of Nerves on their Lateral and Dorsal, and the Great Sympathetics on their Dorsal aspect, the muscles interposed between them and the cutis, being the two Latissimi Colli, the Sternomastoidei, the Omohyoidei, the Sternothyroidei, and Sternohyoidei, although none of these muscles intervene throughout, excepting the two Latissimi Colli.

Their two branches, the ENCEPHALIC and the PERICEPHALIC, have long been observed by many Anatomists to be of different proportional magnitudes, according to the different periods of life, and the truth seems to be, that they vary their size with the magnitudes of the parts on which they are ramified. The ENCEPHALIC is, in general, proportionally larger in the Fœtus, as the Brain of the Fœtus is proportionally larger than that of the Adult. But another cause occasionally combines in varying the proportion, the Superior Thyroid often rises as the third branch of the Cephalic; and though this branch be often proportionally larger in the Fœtus, yet, at all times, by rising either from the ENCEPHALIC, or the PERICEPHALIC, it determines the magnitude to be greatest on the side on which it preponderates.

ARTERIA PERICEPHALICA,

seu

Carotis Externa.

THIS Artery, at its commencement more *sternad* and *mesiad* than the Encephalic, is soon afterwards observed to cross it in a lateral direction, following a course *atlantad* and *dorsad*, beneath the angle of the Basilar Maxilla, and under the Biventer, and Stylohyoideus, towards the seat of the Parotid Gland. Proceeding afterwards through that Gland, till it reaches the neck of the Condylloid Process of the Basilar Maxilla, it at last divides into two branches, that are named the TEMPORAL and INTERNAL MAXILLARY, having previously sent off, separately, or in trunks common to two, the ATLANTAL, or SUPERIOR THYROID, the LINGUAL, the PHARYNGEAL, the LABIAL, the OCCIPITAL, and AURICULAR (*k*) branches.

(*k*) The order in which these branches are named, is generally the order in which they are observed to rise from the trunk, although the laws which regulate these appearances, seem not to be very rigid or defined. In one preparation belonging to Mr. Burns, the trunk itself is a short stem, from the end of which, its branches diverge like Radii from a centre. In another, which has been mentioned already, all these branches arise directly from the Cephalic. At the same time, it must be confessed, that such deviations are extremely rare, as Haller, who examined the Arteries of the Neck, in fifty bodies, and has also been particularly minute in his remarks, has never taken notice of any such anomalies.

ATLANTOTHYROIDEA,

seu

Thyroidea Superior (1).

RUNS *sacrad mesiad* and *sternad*, and passing under the Omohyoideus and Sternothyroideus, at last ter-

Instead of wondering at these execeptions from the general rule, we should rather be surprised that they are so few, and occur so seldom, considering that the parts on which these vessels are ramified, are principally organs of voluntary motion; and regularly furnished with two sets of veins, superficial and deep. Even the forms and relative positions of these organs undergo changes. The two Rami of the Basilar Maxilla, in rising from the base, gradually approximate nearer and nearer to the perpendicular as they advance towards maturity, while the length of the teeth, deepening of the Jaw, and expansion of the Thorax, where the Vertebrae of the neck are not equally elongated, bring the Chin and the Sternum proportionally nearer, generally nearer in the Adult Male than they are in the Female, and nearer in the female than they are in the Fœtus. Besides, as the Jaw is not only deepened, but, compared with the Cranium, more than proportionally lengthened in its growth; and the head of the Sternum not only raised, but projectted forwards, the two Cephalics, and their two branches must, with the Trachea and the Œsophagus, lie in general proportionally deeper in the adult male than they do in the female, and deeper in the female than they do in the Fœtus.

(2) In certain cases, not extremely rare, it rises as a third trunk of the Cephalic. Boyer saw it rising by a common trunk with the lingual, and Mr. Burns writes me, that he has lately seen it rising with the lingual, by a common trunk from the Cephalic; that the lingual afterwards run along the lateral mar-

minates in the Thyroid Gland, where some of its branches, crossing the Trachea, inosculate with their fellows of the opposite side, and others continuing on the same side, inosculate with branches of the *Sacrothyroid*, from the Brachial Artery.

The adjacent parts to which it sends branches, are the Os Hyoides, the Ligament between it and the Thyroid Cartilage, the muscles of the Larynx, the Thyropharyngeus, the Cricopharyngeus, the Thyrohyoideus, the Sternothyroideus, the Omohyoideus, the Sternomastoideus, the Latissimus Colli, and the Cutis.

Its Laryngeal Branch (m).

Its branch supplying the muscles of the Larynx, is named the Laryngeal. It penetrates the membranes

gin of the Thyrohyoideus, crossed the cornu of the Os hyoides, and before entering the substance of the tongue, sent off the ascending Palatine branch. Haller saw it sending a branch to the Thymic Gland. He saw it in the Fœtus and in the adult not inferior in size to the Encephalic, and he saw it equal in size to the rest of the Pericephalic, when he scarcely could observe any appearance of an Inferior or Sacrothyroid. He saw it extremely small on one side, and so large on the other, that it principally supplied both lobes of the Gland. And he oftener than once saw it sending off a Subcutaneous branch, that run on the sternal aspect of the neck, as far as the Thorax, and inosculated with branches from the Mammary Artery. See Fascic. II. and VIII.

(m) Five times out of fifty, or in the proportion of one to ten,

between the Os Hyoides, and the Thyroid Cartilage, is afterwards ramified upon the Membrane lining the Larynx, on the Epiglottis, on the Cartilages, on half of the muscles attached to the two Arytænoid Cartilages, and in places where its ramuli approach the Mesial Plane, they inosculate with the ramuli of the opposite Thyroid.

ARTERIA LINGUALIS. (*n*)

Runs at first *sternad* and *mesiad*, then *atlantad* and *mesiad*, and then *sternad* and *mesiad* again, to the Apex of the tongue. In this course, commencing close by the side of the Pharynx, and running *atlantad* of the Os Hyoides, sometimes *peripherad*, and sometimes *centrad* of the Hyoglossus,

Haller observed this branch rising as a separate trunk from the Pericephalic, accompanied, as it generally or always is, by the Laryngeal nerve. It has also been seen perforating the Thyroid Cartilage, and, according to Murray, sometimes entering between the Thyroid and the Cricoid Cartilages. The central parts of the Larynx are principally supplied by it and its fellow, the branches from the Sacrothyroid that enter the Larynx, being in general so small, that some mention them, as Boyer, and others omit them, as Bichat's Continuator, and Sabatier.

(*n*) Seven times in fifty, Haller observed this Artery rising by a common trunk with the Labial.

it always penetrates the Genioglossus, and from thence stretches onward along the Basilar aspect of the tongue, to its termination.

The adjacent parts to which it usually sends off branches are the Hyopharyngeus, the Hyoglossus, the Geniohyoglossus, the Os Hyoides (*o*), the Mylohyoideus, the Stylohyoideus, the Thyrohyoideus, the Sternohyoides, the Omohyoides, and Biventer Maxillæ, the Epiglottis, the Amygdaloid Glands, the Pendulous Vclum, the tongue itself, the Frænum Linguaë, and Sublingual Glands.

Its Sublingual Branch.

BEFORE it penetrates the Genioglossus, it always gives out a superficial branch, called the Sublingual; and when that is large, many Anatomists, considering the place where this branch arises as the termination of the trunk, describe the natural continuation of the trunk, as if it were a branch, under the name of Arteria Ranina (*p*). The Sublingual branch is seen between the Geniohyoideus and Mylohyoideus, sending its Ramuli to the parts

(*o*) The branch to the Os hyoides, and museles adjacent, is named by Haller the Ramus hyoideus, and arises sometimes from the Pericephalic.

(*p*) According to Portal, the Arteriæ Raninæ are the branches amified on the Frænum.

adjacent. When large, its branches are continued through the Mylohyoideus, and afterwards ramified on the Biventer, the Latissimus Colli, the muscles of the Basilar Lip, and Integuments. When small, it terminates near the Symphysis Menti, but always, says Haller, is a regular branch.

ARTERIA PHARYNGEA. (*q*)

THIS Artery, excepting the Auricular, the smallest of all the regular branches of the Pericephalic, ascends between the Pharynx and the Rectus Capitis Internus Major to the base of the Cranium.

The Anatomist who distinctly recollects its position, and the relative situations of the parts adjacent, must instantly be able to form an idea how it is ramified, and know from its magnitude, that its branches, if numerous, must also be small. These branches or ramuli are sent to the Pharynx, and the muscles of the Pharynx *attendant* of its origin, to

(*q*) There are rarely two, and more rarely three Pharyngeal Arteries, though such have been seen by Haller and Soemmerring. When two, both Haller and Soemmerring have seen one of them from the Cephalic, and one from the Enecephalic. Sabatier has seen the single Pharyngeal rising in common with the Labial Artery, and Haller has seen it rising entirely from the Occipital.

the two Recti Capitis interni, the Longus Colli, the Eustachian Tube, sometimes to the Tympanum, the Sphenoidal bone, the Pterygoid canal, and to the inial part of the nostrils, to the muscles belonging to the Pendulous velum, to the Tonsils and Uvula, *laterad* to the ganglion of the great Intercostal, to the Par vagum, and ninth pair of nerves, sometimes even to the Sternomastoideus, and conglobate glands, while a branch accompanying the Jugular vein ascends into the Cranium, and is afterwards ramified on the Dura Mater, extending occasionally to the Cavernous Sinuses.

ARTERIA LABIALIS (*r*).

APPEARING first by the side of the Pharynx, under the Biventer and Stylohyoideus, it immediately pro-

(*r*) Named also the Facial, the Angular, and External Maxillary. Sabatier has seen it rising in common with the Pharyngeal. It has also been seen rising in common with the Lingual Artery. Haller saw it terminating sometimes in the Coronary Artery of the Basilar Lip; and, at other times, extending as far as the orbits and *museulus frontalis*. Mr. Burns has seen it also terminating at the Basilar Lip. But, "*raro* "*Labia non adit,*" says Haller. Where its branches are defective, their place is supplied by ramifications from the Temporal Artery. To the many varieties of this Artery, mentioned in the notes to his third Fasciculus, Haller has added a great many more in the notes which accompany his eight Fasciculus.

ceeds *Atlantad* and *Sternad* through the depression of the Maxillary Gland, then winds over the base of the Maxilla, near the antinial margin of its ramus; from thence advances to the angle of the mouth between the Zygomatics and the Buccinator, and then stretches to the Ala of the nose, where it inosculates with what is considered the nasal branch of the Ophthalmic (*s.*)

Palatine Branch.

IN this course, the first branch which it gives out is named the Palatine. It is seen lying on the side of the Pharynx, near the Inial Margin of the Pterygoideus Internus, and dividing into two as it approaches the Petrostaphylinus. The parts on which it is usually ramified, are the Pterygoideus Internus, the Stylohyoideus, the Styloglossus, the Stylopharyngeus, the Tongue, the Tonsils, the Eustachian Tube, the Spheno and Petro-staphyline Muscles, the Pendulous Velum, the Palate Bone, and Uvula.

The Trunk afterwards sends out branches directly from itself to the Pterygoid Muscle; branches to

(*s.*) In eodem cadavere. Vidi in dextro latere omnes nasales ab Ophthalmica profectas esse neque a Labiali quidquam ad nasum venisse, cum in altero latere Labialis magna foret et fere sola duos arcus nasales ederet. *Hall. Fascic. viii.*

the Tonsil (*t*), the Stylohyoideus, the Styloglossus, and the Hyoglossus ; numerous branches to the Maxillary Gland ; whence branches to the Membrane of the mouth, and to the tongue, to the Glossopharyngeus, Mylopharyngeus, Pterygopharyngeus, Cephalopharyngeus ; branches running *antiniad* and *laterad* to the Mylohyoideus, and sometimes to the Cutis.

Submental Branch.

ONE of these branches rising in the seat of the Maxillary Gland, is often so large that it has received an appropriate name, and been called the Submental or Submaxillary Artery. It runs *peripherad* of the Mylohyoideus, between the Biventer and the Maxilla, and *centrad* of the Latissimus Colli. It usually divides at the lateral margin of the Biventer, near the Symphysis Menti, into two branches, one of these proceeding *mesiad* across the

(*t*) A similar branch sometimes rises from the Pericephalic, but *raro carotidis ramus*. Soemmerring.

After reading the descriptions of the Labial Artery, as given by Haller, Sabatier, Murray, Portal, Bichât's Continuator, Soemmerring, Boyer, Bell, Fyfe, and comparing some of my own preparations, where the different branches of the Pericephalic are minutely injected, I could not venture to be more particular in my descriptions, without the risk of detailing the varieties of individuals.

Biventer, and the other reflected over the Jaw. When it is large, the size of the Sublingual is proportionally small, and *vice versa*. When it arises from the Pericephalic, as it sometimes does, it sends off the greatest number of the branches that are usually ramified on the Maxillary Gland, and most of the branches which are usually sent from that situation to the muscles of the Pharynx and Isthmus Faucium.

Passing now the base of the Maxilla, the Labial Artery branches out copiously upon the Masseter and Buccinator, and generally through the medium of a large branch on the Basilar Lip. At the angle of the mouth it sends out branches to the Zygomatics and the Levatores Labii, while two branches, primary or secondary, are seen running on the margin of the Lips, under the name of *Coronary Arteries*, and from one of the Coronaries next to the nose, a branch running parallel to the mesial plane, to be afterwards ramified on the Nasal Septum. When the Coronaries meet from the opposite sides, they form what is called a Corona (*u*), or ring, on the margin of the lips; and it has been observed, that when the Coronaries from one side are large, the

(*u*) Alias nullam Coronam vidi ejusmodi, solumque Rete. Haller, *Fascic. viii.*

Coronaries from the other are proportionally small. I have seen the appearance, but, like many of the tortuous windings of the Arteries, had been led to explain it from some difference in the force of the injection.

ARTERIA OCCIPITALIS (v.)

Rises behind the Biventer Maxillæ, and crossing the Internal Jugular *sternad*, follows a direction *laterad* and *dorsad*, till it reaches the space between the transverse process of the Atlas and the mastoid process of the Temporal Bone. From this situation, having passed the Rectus Capitis Lateralis, it sinks under the Sterno-Mastoideus, and after running *dorsad* and *mesiad*, generally *peripherad* of the Complexus, it emerges at last in the space between the Splenii, ascends the transverse ridge of the Occiput, to which, for a while, it had run nearly parallel, and then divides into different branches that spread *mesiad*, *coronad*, and *laterad*, inosculating with their fellows of the opposite sides, and with branches from the Temporal and Auricular Arteries ; the principal parts on which they are ramified being the integuments, the Epicranius, Periosteum and bones, though some of them are large enough to be traced occa-

(v) Seen once by Haller taking its origin from the Encephalic, or Internal Carotid.

sionally penetrating the Lambdoidal Suture to the Dura Mater.

In this course, as it passes the Internal Jugular Vein, it sends along the coats of that vessel a branch that usually enters the Cranium, and inosculates afterwards with the *Meningeals*.

The other branches which it gives out to the Biventer, the Stylohyoideus, the Auricle, the Glands, the Trachelomastoideus, the Sternomastoideus, the Complexus, the Splenius, the Trapezius, the Integuments, the Obliquus Capitis Superior, the two Recti Capitis Postici, and the branches inosculating with the Vertebral Artery, are merely the branches which it naturally gives out to the parts adjacent, among which there is usually observed a *Cervical branch*, that is more or less extensively ramified on the dorsal and lateral parts of the neck, and observed to inosculate with branches proceeding indirectly or ultimately from the Brachial Artery.

ARTERIA AURICULARIS (*w*.)

It rises generally by an acute angle, near the extremity of the Styloid process, and proceeding

(*w*) Haller saw it three or four times rising from the Occipital Artery, and I have seen it, in one preparation, rising not far from the division into the Temporal and Internal Maxillary Arteries.

through the substance of the Parotid, runs *inward* and *lateral* to the fold or depression between the Mastoid process and Auricle, when it spreads into branches ramified on the convex part of the Auricle, and the muscles attached to it, on the Mastoid process, and the muscles which are there, and into branches which extending *coronal*, *inward*, *glabellal* inosculate with branches from the Occipital and Temporal Arteries.

In its course to the Mastoid process and Auricle, it sends out a number of small branches to the Parotid, and generally a branch called the *Stylomastoid* to the Foramen Stylomastoideum. After entering the Foramen,

The Stylomastoid (x)

transmits Ramuli to the Mastoid cells, to the Meatus Auditorius Externus, the Membrana Tympani, the Stapedius, says *Haller*, and the external Semicircular Canal, and these branches meeting with others from the Meningeal and Articular Arteries, particularly on the Membrane, in the Meatus, and in the coronal part of the Tympanum, are observed to communicate by a variety of Anastomoses.

(x) *Haller* saw it twice from the Occipital Artery, once as a primary branch of the Pericephalic, but generally as a branch of the Auricular.

ARTERIA ORBITO-MAXILLARIS, (y)

seu

Maxillaris Interna.

ONE of the branches that terminates the Trunk of the Pericephalic, rises near the neck of the Condylod process of the Basilar Maxilla, and from thence, observing a *mesial* direction, with some tortuous windings, proceeds to the Spheuo-Maxillary fissure, where reaching the inial part of the orbit, it bends *antiniad* along the canal of the Maxillary bone,

(y) As the Maxillary bones have never been distinguished by such epithets as external and internal, the terms external and internal Maxillary, could never have been meant to express the Arteries particularly ramified on these bones. The truth is, the external Maxillary received its name merely from the circumstance of crossing superficially the Basilar Maxilla in its passage to the lips ; and this circumstance, not generally deemed a sufficient reason for imposing the name, some Anatomists have chosen to call it the Angular Artery, from its crossing near the Angle of the Jaw ; others, the Facial, from its being ramified on a part of the face ; while Haller, after assigning his reasons, has called it the Labial, and been followed by most Anatomists since his time. The term Submaxillary being also laid aside for the term Submental, the only Arteries now called Maxillary, is that Artery which, stretching from the neck of the Condylod process of the Basilar Maxilla towards the Spheuo-Maxillary fissure, is afterwards reflected forward through the

and passing through the Infra-Orbitary hole, branches out on the muscles of the Lip, the Gums, Alveolar processes, and Teeth, inosculating with branches from the Labial, Ophthalmic, and Temporal Arteries.

The Anatomist, previously and intimately acquainted with the bones, the muscles, and their relative situations, as he always ought to be, before he enters upon the study of Agneiology, will instantly perceive that this Artery, at its commencement, must be near the Meatus Auditorius Externus, the Articular depression in the temporal bone, and Masseter muscle ; that running on the central aspect of the Maxillary Ramus, it must pass near the Temporal muscle and

Orbit, under the name of the Infra-orbitary, and a branch of that Artery which, entering the canal of the Basilar Maxilla, emerges through one of the Foramina Menti to be ramified on the *γενειον*, or chin. The first of these is named the Internal, the second, the Inferior Maxillary Artery, though the first has no corresponding branch called the external, nor the second any corresponding branch called the superior. This language, from implying relations that do not exist, is apt to mislead ; and, therefore, I propose to call the first, from its passing through the Orbit, the Orbito-maxillary, and the second, from its being ramified on the chin, the Genio-maxillary : the term *Genio* being already familiar to Anatomists, from its entering into the names of the Geniohyoideus and Geniohyoglossus.

Mr. Burns mentions one case, where the Labial and Temporal branches terminated the Pericephalic, and where the Orbito-maxillary sent off the Submental. In short, the usual origins were transposed.

the two Pterygoids; near the canal in the Basilar Maxilla, the Foramen Spinosum, and Foramen Ovale of the Os Sphenoides, the Buccinator, the Maxillary Tuber, the Pterygopalatine canal, the Sphenopalatine hole, and when bending *antiniad* through the canal in the bottom of the Orbit, must pass along the Coronal part of the Maxillary Antre.

From this previous knowledge of its course, he will naturally anticipate most of the parts on which it is ramified, requiring only to be further informed with respect to the manner and extent of the ramification of particular branches. That information I shall try to convey in the following description.

A Ramulus of the branch, distributed upon the Articular depression, has been seen passing through the fissure of Glasserus, entering the Tympanum, and inosculating with Ramuli of the Stylomastoid.

The branches sent to the Temporal muscle are generally two, and are observed to run close to the bones from which the fibres of the muscle originate, the one next the Orbit occasionally sending branches to the Orbit and Lacrymal Gland.

The Genio-maxillary Branch,

called the Inferior Maxillary, and which I have proposed to distinguish by the name of the Genio-

maxillary, immediately before it enters the canal, sends that branch to the Internal Pterygoid, which leaves a depression in the Maxillary Ramus. On entering the canal it runs *basilad*, till it reaches near to the base of the Jaw, then bends *antiniad* between the base and the fangs of the Teeth, sending Ramuli to each of the Teeth, and their Alveolar processes. Arriving at the Foramen Menti, it sends branches onward to the Incisores, and at last, emerging through the Foramen, is seen spreading into several branches upon the muscles of the Basilar Lip, inosculating freely with the branches proceeding from the Labial Artery.

The Foramen Ovale being very near the Foramen Spinosum, a Ramulus is observed running along the third branch of the fifth pair of nerves to the Dura Mater.

Meningeal Branch (z).

THE branch that enters the Foramen Spinosum is always conspicuous, and is well denominated the *Meningeal*. It spreads *coronad*, *iniad*, *glabellad* on

(z) Sabatier saw this Artery entering the Cranium by the Squamous Suture, “ au Milieu de la Suture qui unit cet os (le “ temporal) avec le pariétal,” and afterwards ramified in the usual way.

the Dura Mater, and is the vessel that occasions these arborescent-like depressions (*a*) on the central aspect of the Parietal and Temporal bones, and on the Temporal processes of the Sphenoidal (*b*).

In its course towards the Foramen Spinosum, it occasionally has been seen sending branches to the parts adjacent, and on reaching the Foramen, it has always been seen giving out branches to the tube of Eustachius, and the neighbouring space between the Temporal and Sphenoidal bones.

On entering the Cranium, a branch, in many individuals, seen running *inward* on the Coronal aspect of the petrous portion of the Temporal bone, and passing with a twig of the fifth pair of nerves into the canal of the Portia Dura, was observed by Haller sending a Ramulus to the cavity of the Tympanum.

(*a*) Though generally in a depression or groove where it first reaches the Parietal bone, it is sometimes, however, found in a canal between the two tables of the bone. This I have oftener than once observed, and so has Sabatier, who mentions the precautions which Surgeons should adopt in performing here the operation of Trepan.

(*b*) Sometimes here one of these branches enters the Orbit, near the lateral extremity of the Sphenoidal Fissure, and is afterwards ramified on the Lacrymal Gland.

Buccal Branch.

THE branch called the *Buccal* frequently extends its ramifications through the Buccinator to the angle of the mouth (c) ; while the branch called the *Alveolar* (d) is ramified on the Gums, the Alveolar processes, the Tuber, the Antre, and the Teeth.

The *Pterygopalatine*, or *Pterygopalatines*, pass

(c) Nunc peculiaris est Carotidis Surculus, nunc Surculus Arteriæ Temporalis profundæ vel Alveolaris vel Infraorbitalis. *Soemmerring*.

(d) Like the *Buccal*, very irregular in size and origin, the *Alveolar* is sometimes a primary, and sometimes only a secondary branch of the *Orbito-maxillary*. It is the trunk, however, of the Artery which Haller has dignified with the name of *Dentalis Maxillæ Superioris*. *Eam Dentalem*, says he, *in junioribus prosecutus sum*. In general, a great number of small *Ramuli* are seen entering the Tuber and Alveolar processes, but seldom any branch, very distinguishable from the rest in magnitude, particularly in adults. The first person who minutely described the *Orbito-maxillary Artery*, was Haller, in 1745. The description which he then gave, is, with little variation, to be found in most of the Systems of Anatomy published since his time. But unfortunately the Artery has not been found so regularly uniform as the description ; most individuals presenting varieties with respect to the manner and order in which the different branches originate, with respect also to their relative magnitudes, and the extent of their ramifications.

through the Pterygopalatine canal, branch on the Velum, Uvula, Tonsils, and the Palate of the mouth, where a branch is reflected through the Foramen Incisivum to the nostrils.

The *Sphenopalatine*, or *Sphenopalatines*, are ramified extensively through the cavity of the nostrils, and more especially towards the coronal and the inial aspects.

The *Suprema Pharyngea*, or *highest Pharyngeal*, when it is present, sends a branch to the Vidian Foramen, and branches to the body of the Os Sphenoides and Cephalopharyngei.

The trunk, continued through the canal in the bottom of the Orbit, gives sometimes out a branch that runs back on the second branch of the fifth pair to the Dura Mater ; it also gives branches to the Periosteum within the Orbit, branches that inosculate with ramifications of the Ophthalmic, and branches that descend to the Maxillary Antre.

ARTERIA TEMPORALIS.

THIS Artery continues the direction of the PERICEPHALIC, runs through the substance of the Parotid, and proceeding *coronad* between the Auricle and the

inial margin of the Maxillary Ramus, at last crosses the Zygomatic Arch, and upon the fascia of the Temporal muscle, divides into two conspicuous branches, the one spreading into ramifications *coronad* and *iniad*, the other spreading into ramifications *coronad* and *glabellad*. The first inosculating with the Occipital and Auricular Arteries, the second with branches reflected on the forehead from the Ophthalmic, and both inosculating at the mesial plane with their fellows, which are ramified on the opposite side.

Between its origin and the Zygoma, this Temporal Artery gives out branches to the Parotid, to the Masseter, and transverse branches towards the nose, the coronal Lip (*e*), and the Orbicular muscles of the Orbit.

It sends also branches to the Auricle which, usually running to the convex side, inosculate with branches from the Auricular; branches to the Meatus Auditorius Externus, and a branch to the

(*e*) Sometimes gives off the Coronary Artery of the upper lip, when the Labial Artery is small or defective.

In addition to the regular branches from the Pericephalic, Portal has given a long description of certain branches from this Artery, which he calls the Masseteric. He has seen them from one to four in number, and observes they are irregular in size and distribution. I have seen them also extending trans-

Articular depression, sending a Ramulus through the fissure of Glasserus, to inosculate in the Tympanum with the Stylomastoid; a branch too which penetrates the Temporal Fascia, and is afterwards ramified

versely across the Masseter, and supplying the place of transverse branches from the Temporal Artery. But on no account do they seem entitled to rank with the branches regularly proceeding from the Pericephalic.

The Continuator of Bichât observes, that the several branches of the Pericephalic may be arranged into three classes.

The first class ramified on the organs of voice and respiration.

The second on the first organs of Digestion, *Aux premiers organes de la Digestion.*

The third on the face, which class, he says, is naturally divided into two orders, one ramified towards the surface, and the other ramified through the deep cavities.

But admitting these arrangements, and that the organs of mastication and deglutition, are organs of digestion, what purposes, curious or useful, are such arrangements calculated to serve? Do these Arteries, in consequence of any difference of function exercised by the organs on which they are ramified, exhibit any difference of Character, Generic or Specific, by which we can distinguish an Artery ramified on an organ of voice, from an Artery ramified on an organ of Digestion.

Where Arteries branch in a similar manner, where they happen to be ramified on the parts adjacent, where they inosculate, and where one is observed occasionally to supply the place of another, the distinctions between them, are more in the name, the situation, and relative magnitude, than in their functions.

Nothing is easier than in this way to class and arrange from fancy or whim, and nothing more difficult than to class and

•

coronad and *glabellad* on the Temporal muscle, and even so far as the Angle of the Orbit.

ARTERIA ENCEPHALICA.

seu

Carotis Interna.

THE Encephalic, with the lateral part of the Pharynx (*f*) *sternad*, the Par Vagum, the great Inter-

arrange after the manner of a Bacon or a Linnæus. The first requires only a genius for new-fashioning trinkets and dresses, or inventing new modes of reform to suit the popular taste of the day. The second requires the steady, vigorous, penetrating mind, that takes in the compass of nature at a glance, that learns from herself how to explain her various operations, and how to discover those general laws which the Almighty Sovereign of the Universe has willed her to obey.

(*f*) Some years ago, a gentleman reported to me, that he once had witnessed a case, where a Surgeon, in puncturing one of the Tonsils, had wounded an Artery, by which the patient bled to death in a few minutes. The Artery wounded, was supposed to have been the Encephalic or Internal Carotid. Portal mentions a similar case, but supposes the Artery to have been a large Tonsillar branch of the Orbito-maxillary. Speaking of its size, he says : Et telle quelquefois, qu'on pourroit occasionner la mort si on l'ouvroit, comme cela est arrivé lorsque j'étudiois en Médecine à Montpellier. Un Conseiller de la Cour des Aides fut atteint d'une violente Esquinancie par l'inflammation des Amygdales ; on crut reconnoître un abcès dans

costal, and the Rectus Capitis Internus *dorsal*, proceeds through a loose cellular membrane (g) to the base of the Cranium. Arriving at the base, it immediately enters the Foramen Caroticum, follows the

l'une d'elles. Un Chirurgien habile voulut, à cet effet, l'ouvrir avec le Pharyngotome ; mais il la dirigea si mal, ou l'artère Tonsillaire étoit si grosse, qu'ayant été ouverte, il survint une Hémorragie qui fut bientôt mortelle.

(g) Partly from the laxness of the cellular membrane, and partly from the mode in which it is attached to the coats of this Artery, the Encephalic, between its origin and Foramen Caroticum, is generally inflected more or less by the force of our injections, and, for aught I know, may sometimes be inflected in a similar manner by the force of the blood. Such an inflection, more or less increased in proportion to the force exerted by the heart, may serve to regulate the momentum of the blood as it flows towards the brain, while the windings of the Artery through the canal, like the windings of the Vertebral through the transverse processes, although they contribute to lessen the momentum, cannot vary their effects according to circumstances. In head-achs, in megrim, and even in giddiness, the effects of this momentum are usually felt where the arterial blood is accelerated, and the venous blood proportionally retarded by an inclination of the head downwards.

In comparative Anatomy, it has been observed, that in those animals where the Encephalic proceeds more directly through the base of the cranium, it divides where it passes through the canal, into numbers of small convoluted vessels, which afterwards unite. Such an appearance has been termed a plexus, or when such occurs in the course of the Encephalic, it is termed the Rete Mirabile of Galen, as a similar appearance in the course of the Ophthalmic, has been styled the Rete Mirabile of Ho-

canal that afterwards succeeds, through its different windings, runs by the side of the Sella Tursica bathed in the blood of the Cavernous Sinus, at last reaches the Foramen Opticum on the *mesial* side of

vius. Analogous to these are ramifications in the Mesenteric Arteries of the Sow, and in the Iliac and Humeral Arteries of the Lemur Tardigradus. Mr. Carlisle of London, who observed it in the Lemur Tardigradus, observed it also in the Lemur Loris, in the Bradypus Tridactylus, and the Bradypus Didactylus, and remarking a correspondence between the minute-division of their Arteries, and their slowness of motion, was led to the general and important conclusion, that there are certain specific relations between the species of muscular motions, and the species of vascular ramifications. A similar idea had occurred to Willis, when treating of the Rete Mirabile of Galen; and the truth seems to be, that where changes in any of the functions of organs are connected with changes in the state of circulation, the succession of the changes which take place in the organs, must always be slow proportioned to the slowness with which changes are effected in the state of circulation. In cases, therefore, where the Arteries divide into Retiform plexuses, convoluted or expanded, the actions of the organs on which they are ramified, so far as these actions depend on the quantity or momentum of the blood, must comparatively be more steady and uniform, and whether they be naturally rapid or slow, must be less suddenly influenced by volitions and mental emotions, than in cases where the blood ebbs and flows as quick as thought. In all these cases, the nerves, too, must combine their effects with those of the Arteries, and so, among the nerves, we find that those distributed to organs of voluntary motions, and those distributed to the organs of sense, for the purpose of clear and distinct perception, exhibit, in their course, generally fewer ganglions and plexuses, and,

one of the Anterior Clinoid processes, there penetrates *coronad* through the Dura Mater, bends a little *iniad*, and ultimately divides into two large branches (*h*,) the one running in the Fossa Sylvii, and thence named the *Arteria Sylviana* ; the other running a little *glabellad*, but afterwards bending *coronad* and *iniad* on the part of the hemisphere that lies in contact with the Falciform process of the Dura Mater, continues its course somewhat *coronad* of the Corpus Callosum, and observing nearly a similar direction, has thence been named the *Arteria Callosa*.

Between its origin and the Foramen, it has seldom been observed to send off branches, though Haller saw once the Occipital Artery, and once the Pharyngeal, taking their rise from it.

Between the Foramen, and the place where it penetrates the Dura Mater, minute injections have shown it, when passing near the cavity of the Tympanum, sending in a branch to inosculate with the

compared to the organs in which they terminate, are, in proportion, obviously larger than those distributed to involuntary organs, or the organs of obscure indistinct sensation.

(*h*) Quelquefois elle se divise en trois, en formant le trepied, lorsque communicant en sort au meme endroit ; et en quatre, lorsque l'Artère du plexus Choroïde en tire aussi son origine dans ce lieu. *Sabatier*.

branch from the Meningeal, and, when a little onward, sending a branch through the *inial* extremity of the Pterygoid canal, to inosculate with a branch from the highest Pharyngeal. The most ordinary injections are sufficient to show two of the branches which it gives out in the Receptaculum, or cavernous Sinus, these last being generally ramified more or less extensively on the Dura Mater, on the third, fourth, fifth, and sixth pair of nerves; and it has been shown by Haller and Morgagni to have been Ramuli of these branches that were taken for filaments of the fifth pair, descending *basilad* to the first Ganglion of the great Intercostal.

From the place where it penetrates the Dura Mater, to where it divides into the Arteriæ Sylviana and Callosa, may generally be seen a cluster of small branches ramified upon the contiguous parts, as the Optic nerves, the Pituitary Gland, and the Infundibulum, while one considerably larger than the rest, has sometimes been observed passing over a crus of the Cerebrum, accompanying, for a while, the Optic nerve, and afterwards entering, where some of the smaller usually enter the Basilar part of the Plexus Choroides.

From the same place, are regularly seen rising two conspicuous and well-known branches, the *Arteria*

Ophthalmica and *Arteria Communicans* : The one ramified on the eye and its orbit, and the other forming a communication between the Encephalic, and one of the divisions of the Basilar Artery.

Arteria Ophthalmica.

IN the year 1754, the illustrious Haller published an account of this branch, consisting of eighteen folio pages, accompanied with seven engravings and references, preceded by a preface of six pages, in which he gives a history of what were the labours, the discoveries, and the errors of his predecessors on the same subject. To secure, at once, minuteness and accuracy to his description, he examined this Artery in twenty-four different subjects, injected it regularly with oil of Turpentine that was coloured red, preserved a record of the different series of its ramifications in most of them, of its principal branches in all of them, and would have prosecuted his inquiries farther, had he not been prevented by retiring from Gottingen, and from Anatomy. Some years after, his friend and colleague, the illustrious Zinn, who had previously described some of its minute ramifications, gave also an account of this Artery, in his learned and valuable *Anatomical De-*

scription of the Human Eye, a work which, in 1780, was edited again by the celebrated Wrisberg, accompanied with what he calls a necessary supplement, and several new engravings. To these singular labours of the three learned Gottingen Professors, little has been added of much importance concerning the Ophthalmic.

It appears evident, from Haller's observations, that it does not uniformly, throughout its course, follow the same line of direction in different individuals; that it has not always the same regular number of branches; that its usual branches do not always rise in the same order; that parts supplied by primary branches in one individual, are supplied by secondary branches in another; and that neither the primary nor secondary branches, when examined minutely, present any steady uniform character (*i.*)

It generally enters the Foramen Opticum at the lateral aspect of the Optic nerve (*j.*) and sooner or later crosses it (*k.*) *coronad* towards the *mesial* side of the Orbit, from whence, emerging between the

(*i.*) Divisio et progressus Ophthalmicæ in Orbita non constant est. *Haller.*

(*j.*) Semel vidi Arteriam Ophthalmicam supra nervum incessisse *Haller.*

(*k.*) Ad decursum Ophthalmicæ addere quoque visum est, illam quoque sub nervo Optico progressam animadversam fuisse. *Zinn.*

pully of the Trochlear muscle, and the Palpebral ligament, it runs along the side of the nose (*l*), and there inosculates with branches from the Labial and Orbito-maxillary.

From the great irregularity in the origin of its branches, without regarding whether they be primary, secondary, or ternary, derived immediately or remotely from the trunk, I shall enumerate the several parts on which it is ramified. In the progress of its course, branches are sent to the Dura Mater, branches to the Periosteum and bones of the Orbit, a branch called *Lacrymal* to the Lacrymal Gland, two branches named the *Ethmoidal*, passing through the *Foramina Orbitaria* to the Ethmoidal cells; branches to the Palpebræ and Tarsi that form

(*l*) When it runs on the nose, it is usually termed the Nasal branch of the Ophthalmic, although from its general size and direction in the several adult preparations I have seen, it has oftener appeared the continuation of the trunk, than the Frontal branch, which, though in the fœtus it be sometimes more than equal in size, has a different direction from that of the previous part of the Ophthalmic. But the size of Arteries naturally vary in proportion to the parts on which they are ramified; and it is known, that the bones of the face compared to the bones forming the Cranium, are proportionally larger in the adult, than they are in the fœtus. “Frontalis Arteria truncus est Ophthalmicæ, “aliquando tamen minor nasali ut pro ejus ramo possit haberi.” *Haller, Fascic. iii.*—referring to its appearance in the head of an adult.

arches near the margins of the eyelids ; branches to the Caruncula Lacrymalis and Lacrymal Sac ; two branches comparatively large, reflected over the Superciliary Arch, one named the *Frontal*, the other *Supraorbital*, ramified upon the Superior Palpebra, the Orbicularis, Corrugator, and Epicranius, where they inosculate with several branches from the Temporal Artery ; branches to the adipose substance within the Orbit, to the Levator Palpebrae, the four straight, and the two oblique muscles of the eyeball (*m*) ; numerous branches to the Tunica Conjunctiva, which, in their smaller ramifications, convey only in the healthy state a transparent fluid,

(*m*) Four times out of seventeen, Haller observed the Lacrymal Artery deriving its origin from the Meningeal.

The fifth Section of the tenth Chapter of Zinn's Anatomical Description of the Eye, has for its title, *De corneae vasculis sed suspectis*, &c. and he adds in that section, “ Quae ipse non vidi, “ consulto omisi, uti vascula corneae aliis dicta, quae nunquam “ neque ope injectionis ceraceae neque in Fetu sponte manifesta, “ uti mihi de Arteriis lentis contigit, observare potui.” Perhaps the boasted discoveries of Hovius concerning the eye, which, he says, were made by means of a secret, (*nova injectio ignis ope artificiose confecta*) which he would not reveal, might have excited these suspicions in Zinn ; but although Zinn was correct in declining to describe on his own authority, what he had not seen, he was hardly correct in questioning, without assigning a reason, the judgment and veracity of respectable observers, who said they had seen them.

but in the higher degrees of inflammation admit red globules, and are seen running to the centre of the Cornea; many branches, named *Ciliaries*, to the globe of the eye, penetrating obliquely at different parts the Sclerotic coat; from twenty to thirty, named the short or *posterior Ciliaries*, entering near to the Optic nerve, and forming a close Vascular plexus on the Choroid coat; two or more, called the *long Ciliaries*, entering at a greater distance from the nerve, and some called the *anterior Ciliaries*, of which Haller once counted twelve, and Sabatier twenty, entering not far from the edge of the Cornea.

Some of the Ramuli of the short Ciliarics, extend as far as the Ciliary processes, and it would appear, from mercurial injections, that they are employed to supply part of the aqueous humour. The long *Ciliaries*, when they approach the circumference of the Iris, inosculate laterally through the medium of their branches, and form a ring, while the anterior, by inosculating similarly, form another immediately within it: these rings however are not easily distinguished, as both, in general, seem to unite in forming one circular plexus. From the concave part of this plexus, converging branches with small vascu-

lar areolæ between them, radiate towards the margin of the Pupil, and inosculating laterally, form the interior ring of the Iris, which is seldom perfect, or rather perhaps, is very seldom completely injected.

Of the branches penetrating the Optic nerve, and afterwards running along its axis, one, considerably larger than the rest, is distinguished by the name of *Centralis Retinae*. It is seen ramified upon the concave aspect of the Retina, and by lateral communications, two of its branches were seen by Zinn, in the eye of a Sheep, dividing laterally, like the long Ciliaries, and forming a ring (*n*) on that margin of the Retina, where it seems to terminate at the commencement of the Ciliary Plicæ.

A branch also from this Artery, has occasionally been seen passing through the centre of the Vitreous Humour, to the capsule of the Lens, and, though much seldomer, a branch also passing through the centre of the Lens (*o*) itself.

(*n*) This ring I likewise have seen, and oftener than once in the eye of a Sheep.

(*o*) I must confess, though I never have seen the one or the other of these branches, I feel no inclination to doubt the veracity or accuracy of those who have mentioned them. Sabatier, however, who has seen the branch that penetrates the substance of the vitreous humour, suspects the existence of the branch or branches, that are said to enter the body of the Lens. His sus-

Arteria Communicans,

Surrounded by pellucid cellular membrane, denominated here the Tunica Arachnoides, runs *in*iad

picious seem to arise from the circumstance, that they have seldom appeared to Anatomists after the most anxious and minute research. But if they convey a transparent fluid in their healthy state, how is it possible that they can appear, excepting after rare and lucky injections, or rare cases of violent inflammation. If the natural functions of both the Lens and Tunica Hyaloides, require the most perfect degrees of transparency in every part of them, can it be supposed that their Arteries or Veins are naturally to admit the gross and opaque parts of the blood, or, whenever we choose to make the experiment, the colouring materials of our injections? With better reason might we suppose, that the vessels ramified on the Tunica Conjunctiva, the Cartilages, Ligaments, the Tendons of the muscles, and upon the Medullary part of the Brain, should regularly admit them; but it is known to every Anatomist that they do not. Why then question the existence of one set of vessels, when, by parity of reason, the existence of another, universally acknowledged, should, in numerous instances, be still more doubtful, considering that the parts on which they are ramified do not obviously require that they ever, at any time, should exclude the red globules? The man who resolves to believe only what he sees or remembers, ought not to believe that ever he was born, conceived, or begotten; and should laugh at the person who should try to convince him that he is to die.

Sabatier, Petit, and some others, who, disregarding the principles of Analogy, refuse vessels to the body of the Lens, and leave it wholly unconnected in its capsule, propose to nourish it by imbibition. But, admitting their hypothesis, how is this

and *mesiad* on the lateral aspect of the Infundibulum and *Eminentia Mammillaris*, of its own side, *coronad*, but adjacent to the lateral parts of the Sella Turcica; and then, near the posterior clinoid process and Co-

imbibition to be regulated? How is the Lens to preserve its definite degrees of density towards the centre, and towards the circumference? By what means is it to regulate its form, its magnitude, and its transparency, so as to vary with the periods of life, and yet always to have a definite relation to the rest of the eye, and the rest of the system. How comes it, that it does not imbibe, when it is depressed in the vitreous humour, when pushed through the pupil into the aqueous, or when turned round with the couching needle in its own capsule. Are the fluids which it imbibes ever changed? or remain they stagnant without becoming putrid? How comes it, that, by this imbibition, the Lens seems to grow, and, although inorganic, has all the appearance of a very curiously organized structure. To account for this phenomenon, they shift their ground, and allow it to vegetate. But the moment it vegetates, it must cease to belong to inorganic bodies, it must cease to swell like a sponge by imbibition, it must then be nourished like a plant, must grow like a plant, and its fluids be circulated like the fluids of a plant; as a plant, too, it should also live, and, when it finds suitable temperature and nourishment, should live even independent of the system, and either by itself, or connected with some individual of its species, should propagate its kind. Such are the inferences to which we are led by these hypotheses of an imbibing, or vegetating Lens. They are so absurd, that rather than admit them, I should be inclined to continue in the old vulgar opinion, that the Lens is nourished by transparent vessels, an opinion, though vulgar, accompanied only with this single absurdity, if it be an absurdity, that good fortune, which has shown

ronal part of the Tuber Annulare, communicates (*p*) with one of the larger branches of the Basilar Artery, not far from the place where that branch originates from its trunk.

them occasionally to other Anatomists, had never shown them to Sabatier and Petit.

(*p*) Casserius was the first who gave a figure of this branch, and Willis the first who gave it a name. The *Arteria Sylviana* is considered by Portal as its regular origin. Once he had seen it on the right side, entering the Basilar Artery, and says, that it sometimes enters the Vertebral.

On comparing the two communicating branches, most Anatomists have remarked that the one is often considerably larger than the other. This difference I have likewise observed, but have always been inclined to ascribe it partly to some difference in the force of the injection.

A gentleman lately showed me a drawing, where both communicating branches were wanting. He said, that injecting the Cephalic Arteries, none of the injection flowed into the Vertebrae, and that, afterwards injecting the Basilar Artery, none of it flowed into the Encephalics.

Speaking of the communicating Artery, “De l’Artère communicante,” Portal observes, “on donne ce nom à trois Artères qui reunissent celles du Cerveau.” But although his assertion may be true, that this name has been given to the three Arteries, another assertion is equally true, that the name is absurd; the three Arteries, which this name would insinuate to be only one, are three Arteries, all at some distance from one another; one of them connecting the two Cephalics through the medium of the two Arteriæ Callosæ; and the others connecting the two Cephalics with the two Vertebrae, through the two large branches of the Basilar Artery.

By this, and its fellow of the opposite side, a very free communication is formed between the Encephalic and Vertebral Arteries, and as the two Arteriæ Callosæ, also communicate by one or two transverse branches, or, as I once saw, by forming together a common trunk that afterwards divided like the Basilar Artery, a communication equally free is observed between the two Encephalics. By these inosculations, an area is seen on the base of the Cerebrum encompassed by a chain of communicating vessels, within which chain are seen the Infundibulum, the Optic nerves, and the Mammillary Eminencies, and which, as resting on the base of the Cranium, seems also to encompass a great part of the *Sella Turcica*. This chain of vessels is usually named the circle of Willis, although it is never of a circular form, but always quadrangular, and even the quadrangular form itself differing widely in different individuals. From its situation, it naturally sends branches to the Infundibulum, the Optic nerves, the Mammillary Eminencies, the Crura Cerebri, and the basilar extremity of the Plexus Choroides, when that extremity is not otherwise supplied. The portion between the Arteriæ Callosæ, sending branches to the fore-part of the third Ventricle, the anterior Commissure, a part of the Fornix, and the Septum Lucidum.

By the general connection which this chain establishes between the four principal Arteries that enter the Cranium, the steady uniformity of the circulation throughout the Cerebrum, the Cerebellum, and Medulla Oblongata, must be less dependent upon the extreme communicating branches, and whatever be the motions or positions of the head, *sternad*, *dorsad*, *dextrad*, or *sinistrad*, there are none that can retard the free circulation in some of these vessels, that will not proportionally favour it in others.

Arteria Sylviana.

RUNS at first directly *laterad*, or nearly so, and, before it enters the Fossa Sylvii, sends branches to the Optic nerves, the Plexus Choroides, sometimes even to the Pineal Gland, and such a number of small branches to the Crus of the Cerebrum, that Wepfer considers them as a *Rete Mirabile*. Proceeding in its course to the lateral aspect, it sends branches *glabellad* and *iniad* to the base of the two contiguous Lobes, divided by the Fossa. At the lateral aspect, it spreads *coronad*, *iniad*, *glabellad*, inosculating with branches from the Basilar Artery, and the *Callosa*. Its numerous branches also inosculate among them-

selves, and are regularly seen accompanying the folds of the Pia Mater into the Sulci.

From the Pia Mater, their Ramuli penetrate the Cerebral substance ; but excepting a few that convey red blood, are no longer to be traced by the eye.

Arteria Callosa.

THIS Artery, in the progress of the course already described, sends branches to the Optic and Olfactory nerves ; a communicating branch or two to its fellow of the opposite side (*q*) ; branches to the Basilar

(*q*) “ Vidi,” says Haller, “ Vidi aliquoties anteriorem Carotidis Ramum dextrum, in Cerebrum ejusque lobum anteriorem ivisse. Cum interim sinister solus, duas corporis Callosi Arterias generaret, quae solito more ejus longitudinem retrorsum relegerunt.” This exception from the general rule, is similar to the one to which I allude, where I say, that the two Arteriæ Callosæ sometimes unite in a common trunk. The preparation, in my collection, exhibits the right Arteria Callosa dividing into two unequal branches ; the smallest is confined in its ramifications to the base of the right anterior lobe, the larger of the two bends *sinistrad*, unites with the left Arteria Callosa, which is suddenly enlarged in its diameter, and afterwards divided into two branches of an equal magnitude, which two branches, connected with the brain, were seen reflected *inward* and *coronad*, and occupying the place of the two Callosæ on the mesial aspect of the opposite hemispheres.

Of the first two branches, the largest, which is seen bending

aspect of the anterior Lobe, the Coronal aspect of the Corpus Callosum, and the mesial aspect of its own hemisphere. Of the branches given out on the mesial aspect, some extend as far *inward* as the Tentorium, some run *basalward* to the Corpus Callosum, and some *coronalward*, emerging from the Sulcus between the hemispheres. In every place where they are to be seen, its branches are observed inosculating frequently among themselves, and where they are ramified on the same parts, inosculating likewise in a similar manner with branches proceeding from the Sylvian Arteries, or from the divisions of the Basilar

sinistral to unite with the left Arteria Callosa, is nearly in the place of the communicating or transverse branch. From this circumstance, Haller was probably led to view it as the communicating branch merely. But, from that branch, it differs widely in many respects: it enters the Arteria Callosa at an acute angle, is nearly equal to it in size, contributes much to enlarge its diameter, and admits of no regular interchange of the circulating fluids between the right and the left side, as it regularly sends its blood to the left or common trunk, the only channel that now remains for the blood of the right Arteria Callosa to get to the mesial aspect of its hemisphere.

I have only to add, that the word *aliquoties*, which is used by Haller, seems to imply, that he had observed this appearance oftener than once; a circumstance which naturally suggests the question,—why does the right Arteria Callosa so often incline to unite with the left, and not the left be equally inclined to unite with the right?

Artery (*r*). It need scarcely be observed, that this Artery, like the preceding, being intended for the nourishment of the brain, must also send, through the medium of its branches, innumerable Ramuli to the Cerebral substance, although few of their number, excepting those conveying red blood, can ever be traced by the Anatomist.

Even the Ramuli conveying red blood are, in general, so small, that were it not for blood oozing out upon the dissections of the Medullary substance, they would not unfrequently escape our notice; but granting they could be readily discerned, so numerous and minute are the divisions and anastomoses of both the Encephalic and Vertebral Arteries, immediately before they enter the Cerebrum, the Cerebellum, and Medulla Oblongata, that the Anatomist could hardly, with any degree of propriety, extend his description beyond the larger ramifications that are seen spreading on the Pia Mater, running on the surface of the Cerebral organs, or entering into the Plexus Choroides.

(*r*) “Ultimi rami aliquando in falcem iverunt: Inque Principium Tentorii, etiam Wepfero observante, p. 110. et Vieus-senio, p. 32. Winslow, l. c.—*Haller*.” These authorities are unexceptionable, although the fact, that Arteries extend their ramifications between the Pia and the Dura Mater, independent of any previous disease, be not supported by general Analogy.

ARTERIA BRACHIALIS.

THIS Artery, as already defined, is the vessel ramified upon the Atlantal or superior extremity. On the right side, it generally rises with the Cephalic from the Arteria Innominata. On the left, directly from the arch of the Aorta. Between its origin, and where it emerges from under the Clavicle to the Axilla, it is known by the name of Subclavian (*s*) Artery. From the Clavicle, till it leaves the cup of the Axilla, or passes the tendons of the Pectoralis

(*s*) The term *Subclavian* can be used only in an arbitrary sense in those numerous species of quadrupeds that are destitute of Clavicles; in these the Artery, almost immediately after its origin, becomes Axillary.

“Vigesies et octies, has Arterias (nempe artus superioris) ab anno retro 1737, descripsi sed superioribus annis fusius (“*ad annum 1752.*” Inde nata est nimia pene ubertas quæ forte, “Lectori fastidio erit, mihi certe summi laboris causa fuit, cum “in multis et subtilibus particulis toties naturam variari viderem, ut passim omnino nulla spes esset tot diversorum systematum unica historia comprehendendorum ut in arcu profundo volæ adparet. In reliquis, ut alibi monui, unam bene plenam descriptionem pro tela subposui cui reliquas observationes intexerem quæ ex aliis corporibus natæ essent. Arcum volæ repetito expressi, ut obscuram partem quantum fieri posset faciliorem redderem, maxime perforantes inferiores.”—*Haller, Fascic. vi.*

and *Latissimus Dorsi*, it is called the *Axillary Artery* ; and from the *Axilla* to the bend of the arm, the *Humeral Artery*, and often the *Brachial*.

No Artery in the human body is ramified on parts that exhibit such varieties of voluntary motions, and no Artery, perhaps, in the body, presents such diversities of ramification. Haller examined it in twenty-eight bodies, and though he saw not all its branches, yet he saw enough to make him despair of ascertaining, in particular places, what was its common and regular distribution. Impressed, therefore, with a sense of the difficulty of including its varieties in a general description, he sometimes, as in the palm of the hand, enumerates them separately, sometimes describes a particular variety, as the common distribution, and viewing that as the warp of a web, interweaves into it afterwards all the varieties of ramification which he had seen in other individuals. This last method is most decidedly the worst of the two. It has necessarily led him to describe a fiction instead of a reality. For his ramifications, artificially combined, though not so extravagant as the combination of a man and a horse in the fabulous Centaur, or a woman and a lion in the figure of a Sphinx, are still combinations that must ultimately be traced to the workings of fancy, and not to the operations

of nature. Yet, unfortunately, Haller has, in his scheme, been more or less followed by all the different writers of systems, from Sabatier downwards, all of them either copying from him, or from one another (*t*), though occasionally introducing a little of their own in matter or manner, to give their descriptions something like a dash of originality.

But, without the aid of any of these artificial combinations, a more natural way to convey an idea of this Artery, and its ramifications, is to follow it through every part of its course, and in describing it, to mention the places where, in general, it is uniform, and where it is variable, with respect to its relative size and position, the number, origin, and distribution of its branches. On no account, must we think of treating it as the tyrant Procrustes treated his guests, who, by stretching the short, and amputating the tall, made them all commensurate to the size of his bed. In short, the Artery must dictate to us, and not we to the Artery, what is to be the proper description.

To the common practice of describing under separate heads, its Subclavian, Axillary, and Humeral

(*t*) We can hardly believe, that in copying from nature, they could have observed the very combinations that he had projected, and which never had been seen in nature before.

portions, there can be no rational objection ; the error lies in considering these portions as separate trunks ; and here the Anatomist, who, by actual observation, has corrected the ideas which he first had received through the medium of a vague and obscure language, should not persist in communicating his ideas through the same improper medium to others, merely that they, as well as he, might be put to the trouble of correcting them afterwards by actual observation.

THE SUBCLAVIAN PORTION,

ON the right side, ascends more *atlantad* than upon the left, and forms, therefore, a different curve, as it passes *laterad* to the Axilla. On the right side, also, supposing the Arteria Innominata its trunk, and the Cephalic one of its branches, it regularly gives out one-half of the branches that are ramified on the Neck, the Head, and the Brain, while on the left, it sends no branches at all to the Head, and only the Vertebral Artery to the Brain. On both sides it passes under the Scalenus Anticus, and while approaching the edge of that muscle, is almost in immediate contact with the Pleura, perforates a plexus of the great Sympathetic, passes across and behind the Par Vagus, the Phrenic nerve, the

Descendens noni; and the internal jugular Vein. Where it passes *dorsad* of the Scalenus, the Subclavian Vein, being nearly opposite, crosses that muscle on the sternal aspect; emerging from under the lateral margin of the Scalenus, it reaches the Axillary Plexus of nerves, and along the sacral margin of the Plexus, runs under the Clavicle to the Axilla, resting in this part of its course on the first rib and the first Intercostals, which are here interposed between it and the Cavity of the Thorax. The first part, between its origin and the Scalenus, is accurately defined; the second part, between the Scalenus and the Clavicle, is indeterminate, as the Clavicle is liable to changes of position, ascending sometimes, and sometimes descending. It might be more correct to call it Axillary where it joins the Axillary Plexus of nerves, and lies on the out side of the Thorax (*u*). Yet, be that as it may, taking the term Subclavian in the ordinary sense,

(*u*) Some have asserted, that after giving off the Cephalic Artery, it is still larger upon the right than the left side; but this assertion has not been confirmed by the observations and experiments of Haller. Where a difference exists, the Artery will naturally be largest on the side where the arm is largest, and is most employed in invigorating exercise. An anonymous writer, mentioned by Haller, maintains that, contrary to the common opinion, the vessels on the right side are the smallest, and

the regular branches from this portion of the Brachial Artery which rise separately, or which rise in trunks common to two, are the ARTERIA STERNALIS (*v*), or *Mammaria Interna*; the SACRO-THYROIDEA, or *Thyroidea Inferior*; the INTERCOSTALIS PRIMA (*w*), or *Intercostalis Superior*; and the VERTEBRALIS (*x*).—The other branches that

that, in conveying their proportion of blood, they, therefore, convey it with a greater velocity, which induces animals to use the right Atlantal extremity in preference to the left. It is not improbable, that this writer, like many others, was more in the habit of seeing what he believed, than of believing what he saw.

(*v*) The term *Sternalis* is borrowed from Portal, and is preferable to the vague term *Mammaria*.

(*w*) Enumerating the Intercostal Arteries in the same order that we do the Nerves, Intercostalis Prima is more definite than Intercostalis Superior.

(*x*) To these four regular Arteries, some Anatomists have added a *Cervicalis Profunda*, or *Posterior*, a *Cervicalis Superficialis*, or *Transversa*, and a *Scapularis Superior* of Haller, supposed the same as a *Dorsalis Scapulæ* of Vidijs, a *Supra Scapularis* of Ravius, or a *Scapularis Externa* of Heister and Winslow. Even Murray, who has made the following remark, “*Rami Subclaviæ horumque surculi infinite multas offerunt variationes, ut fere nunquam descriptiones, nec quoad ramulorum numerum, nec quoad eorum decursum, ex omni parte cum ipsa natura quadrent,*” soon forgets his own observation, and instead of describing the general and specific characters of these branches, gives a minute and tedious detail of the varieties that occur in individuals.

are seen ramified in the vicinity, on the deep or superficial parts of the neck, running transversely towards the Scapula, or running *sacrad* towards the Thorax, disclaim any fixed or determinate origin, rising in one individual from the trunk, in another from one of the regular branches, but scarcely acknowledging a particular branch, or any particular place of the trunk, or any particular mode of originating more than another ; and, we also may add, even the regular branches themselves show often a tendency to assume this lawless and unsettled character.

~~ARTERIA VERTEBRALIS~~
ARTERIA VERTEBRALIS

THOUGH not the first of the four branches (*y*), yet, as it completes the Arteries of the Cerebrum and Cerebellum, we shall make it the first in the order of description. It passes to the Cranium through the transverse processes of the Cervical Vertebrae, and although it generally enters at the sixth, it occasionally has been seen entering at the seventh, and from the seventh to the third inclusive (*z*).

(*y*) On the left side, where the Aorta is near to the transverse processes, it has often been seen rising from the Arch.

(*z*) “ Pénétrant le trou de l’apophyse transverse de la sixième
“ ordinairement, quelquefois cependant de la septième Vertèbre

From the place where it enters, it passes successively through all the remaining transverse processes of that class of Vertebrae. On passing the atlas, it runs for a little horizontally and *dorsad* upon the

“Cervicale.—*Portal.*” “Vidi a Trunco Aortæ in sinistro latere ortam. Vidi quartæ ut Eustachius habet, T. xxvi; aut tertiæ Vertebrae Foramen subire.”—*Haller, Fascic. ii.*

Mr. Burns informs me, that he lately saw it lying directly behind the Cephalic, and running as far as the Sacral margin of the Thyroid Cartilage, before it entered the Vertebrae.

“Hebenstreit a trouvc l'Artère Vertébrale double d'un côté. —*Portal.*” “Quin duas viderunt Arterias Vertebrales, quorum una processum transversum *quintæ*, altera *septimæ* Vertebrae colli subit.”—*Soemmerring.* *Viderunt* is without a nominative, so we are not informed who saw these Arteries.

While saw the Vertebral Artery of the right side supplying the place of the right Encephalic, and three times larger than the Vertebral Artery of the left side. As an excellent illustration of the manner in which the Arterial System is accommodated to different changes of circumstance, I shall quote the passage, which is seldom seen, but often referred to, at full length. “Non ita pridem cujusdam defuncti cadaver dissecuimus, quem *schirrhus* intra mesenterium ingens, ac demum ulcerosus, extinxerat: in eo, dum eranio aperto, quæ ad *εγκέφαλον* pertinebant lustravimus, *carotidem dextram* intra eranium emergentem, plane *osseam*, seu potius *lapideam* (cavitate ejus fere in totum occlusa) invenimus; adeo ut sanguinis influxu hac via denegato, mirum videatur, quare æger non prius interiisset Apoplecticus; quod equidem in tantum abfuit, ut mentis suæ, et functionis animalis libero usu ad extremum vitæ momentum potiretur. Enimvero contra illud Apoplexiæ periculum, natura remedium satis idoneum substituerat; nimirum

Atlantal aspect of that Vertebra (*a*), then bends *coronad*, *antiniad*, and *mesiad* through the Foramen Magnum of the Cranium, meets with its fellow of the opposite side (*b*), as it approaches the Tuber Annulare, and there the two uniting together, form what is called the *Arteria Basilaris* (*c*). The Basilar Artery being thus formed, and also enveloped in

“ ex eodem latere quo carotis defecerat, *Arteria Vertebralis*,
 “ Tubuli mole aucta, *pari sua* alterius lateris triplo major cras-
 “ cerat. Quippe sanguis *Carotide* exclusus, vertebralis solito
 “ vectigali sese insuper addens, et duplicato fluvio in eundem al-
 “ veum confluens, Arteriæ istius canalem ita supra modum di-
 “ lataverat : Vir Egregius circa initium ægritudinis suæ atroci
 “ capitis dolore, juxta latus sinistrum torquebatur ; ejus causa
 “ nescio an probabilior assignari possit. quam quod sanguis Ca-
 “ rotide dextra exclusus, cum primo in sinistram impetuosius
 “ irrueret, membranam distenderat ; ideoque idem affectus pos-
 “ tea sponte evanuit, nimirum sanguine superfluo per arteriam
 “ vertebralem derivato.”—*Cerebri Anatome, cap. vii.*

(*a*) Although it runs here generally in a groove, I have oftener than once observed it running in a canal formed on that aspect of the Vertebra, where it points to the Cranium.

(*b*) “ Hic, *Arteria Vertebralis* altera multo altera crassior
 “ est. *Vertebralem dextram*, Morgagni *De Sed. et Caus. Mor-*
 “ *borum.* 2. p. 310. quadruplo crassiorem sinistra vidit. Ejus-
 “ dem nunc dextram, nunc sinistram crassiorem vidi.” *Socm-*
merring.

(*c*) “ Valde rara vero fabrica est quam Cl. Hevermannus,
 “ Tab. viii. expressit neque mihi visa, ut ramus neque exiguus,
 “ transversus Arterias duas Vertebrales conjungat.”—*Haller*,
Fascic. vii. p. 9.

the Tunica Arachnoides, extends *coronad* on the Basilar aspect of the Tuber Annulare, till it reaches as high as the posterior Clinoid processes of the Sella Turcica. Here it divides into two branches, which, united each with the Encephalic of its own side, by what is called the *Arteria Communicans*, are afterwards ramified partly on the middle, but principally on the Inial lobes of the Cerebrum.

In passing from transverse process to transverse, and from the Atlas into the Cranium, the Vertebral Artery sends out branches to the muscles adjacent, and where it has the greatest distance to cross between the Vertebra Dentata and Atlas, sends out branches that are larger than the rest, and which, after spreading on the neighbouring muscles, are seen inosculating with branches from the Occipital Artery.

In its passage through the processes, it runs *sternad* of the Cervical nerves that issue through the Inter-vertebral spaces, and is one of the Arteries which, through these interstices, sends branches to the Spinal Marrow and its Involucra (*d*).

- (*d*) “ Quatuor Involucris Spinalis Medulla Circumvestitur.
 “ Quorum *primum* est membrana nervosa, crassa et fortis quæ
 “ internæ Vertebrarum specus superficiei firmiter adhæret.—
 “ *Secundum* est membrana crassæ meningi continua.—*Tertium*

Meningeal Branch.

SOMEWHERE in the space between the second of the Cervical Vertebrae, and where it enters the cavi-

“est membrana tenuis et pellucida, Pia meningi continua.—
 “*Quartum* Piæ meningis productionem esse asserimus tertio
 “paulo crassius et validius apparet.”—Vide Vieus. Neuro-
 graph. Universal. lib. ii. cap. 2. Haller alludes to these Involucra, where he treats of the Arteries of the Spinal Marrow in his seventh Fasciculus, and calls the first the *Involucrum Vertebrarum*. But though authors have talked of this *Involucrum* since the days of Galen, they seem not to have conveyed any clear and precise ideas of its nature and extent. Winslow, who has given the most accurate description of it under the name of *Tuyau Ligamenteux Entonnoir*, describes it as formed of the Fascia Longitudinalis Postica Vertebrarum, and of that dense Cellular membrane, which continued from near the sides of the Fascia, adheres closely to the convex aspect of the Dura Mater, but is loosely connected with the central aspect of the Vertebral canal. Weitbrecht, offended that two parts so different in appearance, structure, and function, should be confounded, and nature herself mis-shapen and distorted, to suit the mistaken ideas of Anatomists, denies the existence of such a *Tuyau Ligamenteux*. For, “Nullum,” says he, “nullum Ligamentum seu
 “*Involucrum* infundibuliforme ex mente autorum proprie sic
 “dictum et perfectum existit.” And speaking again of the Fascia Longitudinalis Postica, or Ligamentum Posterius Vertebrarum, observes, “Equidem non nego, in Peripheria Postica
 “canalis similiter membranam aliquam adesse, quæ primo ob-
 “tutu, cum Fascia ista totam meningem obvolvere et hinc
 “unum quasi tubulum constituere videtur. Sed primo hæc
 “membrana cum meninge adeo pertinaciter adhæret ut non sine

ty of the Cranium (*e*), it sends off the *Posterior Meningeal*, or posterior Artery of the Dura Mater, an Artery which is afterwards extensively ramified on that membrane where it encompasses the Cerebellum, and which often is seen, through the medium of its branches, inosculating freely with the other Meningeals.

“ laceratione divelli queat, &c.—Contra vero, Fascia nostra
 “ postquam a secunda Vertebra descendit, cum meninge laxa,
 “ cum Vertebriis autem arctius cohæret.—Membrana posterior
 “ soli meningi data esse videtur, qua tanquam Tunica nova cor-
 “ roboraretur : Fascia autem nostra ad Vertebra omni jure
 “ pertinet.”

Where Haller, therefore, in describing the Arteries of the Spinal Marrow in the seventh Fasciculus, makes the distinction between the Involucrum Vertebrarum and the Dura Mater, he must mean by the former, that membrane which adheres closely to the Dura Mater on its dorsal aspect, and which is known but partially to surround it.

In his second Fasciculus, where he had not so minutely examined the Involucra, he makes the Vertebral Artery to send off *a rimum majusculum cum singulo nervorum pare ad medullam spinalem*. But afterwards finds, vide *Fascic. viii.* that the branches which regularly pass through Vertebral interstices, go often no farther than this first Involucrum, or Involucrum Vertebrarum.

(*e*) “ In ipso denique aditu ad Cerebrum non raro, aut prius
 “ ad primam vel secundam Vertebra, quod mihi frequentius
 “ visum est, Arteriam Posteriozem duræ Membranæ emittit,
 “ quæ longe lateque per Cerebelli sedem in Cranio regnat,
 “ tum super crucem Occipitis, sinusquæ transversos tum versus
 “ processus Clinoides.”—Haller, *Fascic. vii. p. 7.*

Inferior Cerebellar Branches,

WHEN within the Cranium, generally from the Vertebral, although occasionally from the Basilar Artery, one or more branches that sometimes unite, are seen bending *coronad* and *iniad* between the crus of the Cerebellum and Medulla Oblongata, and spreading as far as the Vermiform process. This Artery or Arteries, together with their fellows of the opposite side, are named *Inferiores Cerebelli* by Murray, and *Profundæ (f) Cerebelli* by Haller. Passing by the sides, from the Basilar to the Coronal aspect, of the Medulla Oblongata, they give out

(f) “ Pollice vero prius, says Haller, quam conveniat uter-
que truncus, retrogrado angulo nasci solet *Arteria Cerebelli*
“ *Profunda*, non valde distincte a Scriptoribus Proposita.”
Sabatier, when treating of it, says, “ Avant M. de Haller, n’avait
pas été decrite avec toute l’exactitude qu’elle mérite.” Portal,
I suppose, from not thinking it a constant branch, has not
deigned to mention it, and even Haller’s account of it, is not
much in favour of its regularity. “ Non autem perpetuo eodem
modo provenit hæc Cerebelli Arteria nam nonnunquam in
uno latere a separata adhuc Vertebrali, in altero ab iisdem
truncis coalitis nascitur. Alias a separata quidem hactenus
Vertebrali prodit, ut tamen duo trunculi sint, qui continuo
confluunt. Vidi dextram Arteriam parvam fuisse, sinistram
insignem ut ea sola utrinque comitem vermis ramum cderet.
Alias omnino unica fuit lateris sinistri ut non, alius dexter
impar truncus adesset in eo cadavere.” *Fascic. vii. p. 8.*

branches to its *basilar, lateral*, and *coronal* surfaces, ramified from the Tuber to the Spinal Marrow; and partly on the nerves in the vicinity, the Corpora Olivaria and Corpora Pyramidalia.

On the Coronal aspect of the Medulla, where they run between it and the Cerebellum, they give out branches to the fourth Ventricle and its Choroid Plexus, and afterwards spread on the neighbouring surfaces of the Cerebellum.

Superior Cerebellar Branches.

TOWARDS the further extremity of the Tuber, one or more (*g*) branches from the opposite sides of the Basilar Artery, are reflected by the sides of the Crura Cerebri, from their Basilar to their Coronal aspect, and reflected, consequently, in that angular space between the Crura Cerebelli and Cerebri, where these first meet in the Tuber Annulare; these branches are also ramified on the Cerebellum, and known by the name of *Superiores Cerebelli*.

In their course, they send branches to the Crura Cerebri and Crura Cerebelli; branches to the Choroid

(*g*) “ Non rarum est pro uno ejusmodi ramo, (*sc. Arteria*
 “ *Superiore Cerebelli*) duos tresve sibi parallelos similesque
 “ fuisse, ut tunc quidem, quos nos ramos (*ejus trunci*) dicemus,
 “ *ii diversi trunci sint.*”—*Haller.*

Plexus, lying on the Thalami, to the Corpora Quadrigemina, the Pineal Gland, the Valve of Vieussenius, and the fourth Ventricle, and, like the preceding, are afterwards extensively ramified on the neighbouring surfaces of the Cerebellum.

Posterior, or Deep Cerebral Branches.

A LITTLE onward, beyond the origin of the third pair of nerves, the Basilar Artery ultimately divides into two branches, which, after communicating with the two Encephalics, in order to form the circle of Willis, are reflected in a similar manner as the last, and very nearly in parallel curves, but, running *coronad* of the Tentorium, terminate in the Inial lobes of the Cerebrum, on which they are ramified, and from which they are named the *Profundæ*, or *Posteriores Cerebri*.

At their commencement, they send branches to the basilar part of the third Ventricle, the Mammillary Eminencies, the Crura Cerebri, the Optic nerves, the Thalami, the Corpora Quadrigemina, the Pineal Gland, and the Choroid Plexus; reflected *coronad*, they again distribute, from a different aspect, a new set of branches to the third Ventricle, the Thalami, and Fornix; branches also to the lateral Ventricles, the Corpora Striata, the Corpora Quadrigemina, the

Pineal Gland (*h*), and the Choroid Plexus. Their ultimate branches are ramified on the middle, and the Inial lobes, where they communicate with extreme branches from the *Arteriæ Sylvianæ* and *Callosæ*.

(*h*) The plexus which they form with the other branches on that portion of the Pia Mater, which spreads over the Corpora Quadrigemina, and the Pineal Gland, and which leaves its impression upon the concave surface of the *Lyra*, or triangular space, between the Inial Crura of the Fornix, is properly the *Rete Mirabile* of Columbus. But, indeed, the whole of the Pia Mater presents a close and continued plexus of minute blood-vessels; out of which different authors, as they happened to fancy different parts in searching for the *Rete Mirabile* of the ancients, which was not there, have formed different *Retia Mirabilia*. See *Haller, Fascic. vii. p. 13*. “ Si *Rete Mirabile* “ *usquam est*,” says Columbus, “ *Hoc esse affirmare audeo*, “ *nusquam enim tam admirandum Arteriarum minimarum*, “ *innumerabiliumque plexum, perplexumque et intertextum* “ *videre poteris* ;” and having previously remarked, that it is formed of the two Vertebral Arteries, and the two Encephalics, a circumstance, he adds, that had never been observed by any person before, and which I may add, has never been observed by any person since, he insinuates that they are guilty of impiety who presume to place it in the neighbourhood of the Pituitary Gland. “ *Galenus*,” says he, “ *Galenus suum Rete* “ *Mirabile supra Sphenoidem describebat: Ubi Glandula illa* “ *adest omne id excrementum suscipiens, quod in Cerebro gignitur*: huic enim muneri fuit a natura dicata. Sed nonne “ *impium quod piis hominibus videri potuisset, graviterque accusanda fuisset natura: Si Natura, quæ prudens, et oculatissima in hominis fabrica esse solet, ac debet, tam nobilem*

Besides the above, numerous branches, though without a name, are sent out laterally from both the Vertebral Arteries and the Basilar to the Tuber Annulare, the Medulla Oblongata, and the Cerebellum ; and one also, distinguished by a name, but, like the rest, more regular in its course and destination than in its origin, enters the canal of the Portio Dura to spread on the Vestibule, the Semi-circular canals, and the Cochlea. It is called *Arteria Auditiva Interior*.

ARTERIÆ SPINALES.

THE Medulla Spinalis, generally supposed a continuation of the Medulla Oblongata, and, consequently, of the two Crura of the Cerebrum, and the two Crura of the Cerebellum (*i*), is nourished

“ plexum, tam insignem, tamque admirabilem in loco non
 “ modo humili, sed tot excrementorum sentina, ne cloacam
 “ dicam, collocavisset. *Real. Columbus De Re Anatomica*,
 “ Lib. vii.”

(*i*) “ Quamquam Medulla Spinalis juxta Hippocratis et Ga-
 “ leni mentem, Cerebri productio vel Cerebrum Oblongatum
 “ dici possit, ipsam tamen a Cerebro produci existimandum non
 “ est; una namque pars alterius causa dici nequit. Verum
 “ hoc ita intelligi debet, Spinalem nempe Medullam et Cere-
 “ brum esse partes consimilibus e substantiis conflatas.

“ — Si Medulla Spinalis una cum Cerebro noctu Aeri ex-
 “ posita relinquatur, multo mollior evadit quam Cerebrum.

by certain Arterial canals, situated on its *dorsal* and *sternal* aspects. These canals are named the *Posterior*, and the *Anterior Spinal Arteries*. Willis was the first who particularly directed the attention of Anatomists to these vessels, though from the manner in which he, and afterwards Vieussenius, chose to represent them, Haller suspects, and with some reason, that their figures were not accurately copied from nature.

Their appearances differ in different individuals. The two *Sternal*, near the Atlantal extremity of the Neck, are generally observed uniting into one, and continuing united through all the rest of the Vertebral Tube. The two *Dorsal* are generally observed to unite and separate, and to unite and separate again, and when they are separated, to communicate frequently by transverse branches. The Dorsal and Sternal, also communicate by transverse branches, and sometimes the Dorsal meet with the Sternal, by wandering *laterad* in serpentine wind-

“ — Alba Medullæ Spinalis in Oleo coctæ substantia in fibrillas dividi nequit.

“ — Licet Cerebri in Oleo excocti Medulla in tenues, e quibus conflatur fibras dirimi possit.

“ — Verum hæ discriminis rationes, distinctas materiæ naturas non arguunt.”—*Vide Vieussen. Neurograph. Univers. lib. ii. cap. 3.*

ings. The Sternal, in places where they are separate, are generally observed to be larger than the Dorsal. The Dorsal terminate with the Spinal Marrow, about the second of the Lumbar Vertebrae; the Sternal united, are continued to the extremity of the Cauda Equina.

On the Cauda Equina, Vieussenius represents them as branching out in a manner similar to the Spinal Marrow; but I rather suspect he has seen that appearance with such eyes as the Poet saw trees, churches, and strange visages in the "red cinders." There is no doubt, that every nerve of the Cauda Equina is supplied with Arteries, but not with Arteries branching from the Spinal, and running longitudinally through their whole extent, till they issue from the tube of the Vertebral column. The anterior Spinal extends to the Coccyx, and inosculating with branches that enter the tube through the Intervertebral spaces in the Loins, and through the Foramina of the Os Sacrum, forms a plexus that afterwards supplies the nerves of the Cauda.

Both the Sternal and Dorsal canals, are usually described as commencing within the cavity of the Cranium, and as springing from either the branches or trunks of the Vertebral Arteries, and chiefly, for the reason, that the tributary branches in that situa-

tion enter the canals at their extremities, of which branches, the canals are afterwards supposed to be only the continuations. Thus, from the Vertebral Arteries, or the Basilar, a branch or branches (*k*), two or more uniting, enter the extremities of the Sternal canals; while, from the *Inferior* of the Cerebellum, a branch or branches (*l*), two or more uniting, enter the extremities of the Dorsal canals.

These canals are also described as receiving branches from the Vertebral Arteries, the deep Cervical, or some branches of the Sacrothyroid in the region of the Neck, from the Intercostals in the region of the Thorax, and from the Lumbar in the region of the Loins, and receiving these branches opposite to each Inter-vertebral space. But the truth is, although they always receive branches from the neighbouring Arteries in these regions, observation and experience have not shown, that they receive

(*k*) “ Cette Artère (l’Artère Spinale Antérieure) est quelquefois, comme on vient de la dire, formée par la reunion des Arterioles fournies par une Vertébrale.”

(*l*) “ Cette Artère (l’Artère Spinale Postérieure) provient des Rameaux que l’Artère Vertébrale fournit a la partie postérieure de la moelle allongée, et a la partie postérieure de la moelle Epinière, desquels quelques uns après avoir concouru à la formation du lacs qui l’entoure, se reunissent, et forment l’Artère Spinale Postérieure.”—*Portal*.

them in any regular and uniform manner, proportioned to the number of Vertebral interstices (*m*). The branches that communicate with the Spinal canals in these regions, are known by the name of *Arteriæ Medullares*, to distinguish them from those that enter the tube, but are afterwards ramified upon the Involucra. Each *Medullaris*, so far as the Ligamentum Denticulatum is continued, generally divides into two Ramuli (*n*), a *Dorsal* Ramulus entering the *Dorsal*, and a *Sternal* entering the *Sternal* canal.

The other branches entering the tube of the Vertebral column, are those which are ramified on the *Dura Mater* and *Involucrum Vertebrarum*; the first might be named the *Vertebro-Meningeal*, the latter the *Vertebro-Involucral Arteries*. The *Vertebro-*

(*m*) “ Horum ramorum qui nervis ramulos dant, piæque membranæ, et cum Spinalibus longis varie inosculantur, numerus minor est, quam Vertebrarum, et multa sæpe Vertebrarum intervalla ejusmodi ramo destituuntur tam Anteriori quam posteriori. Quæ vero deficient, nulla, credo, lege constitui potest, neque res perpetuitatem habet.”—*Haller, Fascic. vii. p. 15.*

(*n*) “ Ejusmodi *Medullares Arteriæ* aliæ Antiores sunt, aliæ posteriores, idque discrimen superest, quam longum est Ligamentum denticulatum, nempe ad Pollicem fere supra finem *Medullæ Spinalis* primamque *Lumborum Vertebra*.”—*Haller, Fascic. vii. p. 15.*

Meningeal are smaller in size, and fewer in number than the *Vertebro-Involucral*, the last are larger, and even more numerous than the *Medullares*; they enter at each Inter-vertebral space from the Atlas to the Coccyx, and, when they enter, generally send off four Ramuli, two of them running in opposite directions, *atlantad* and *sacrad*, to unite with their fellows of the neighbouring interstices on the same side; and two running *mesiad*, one by the Dorsal, and the other by the Sternal part of the tube, to unite with their fellows of the opposite side (*o*).—A *Medullaris*, a *Vertebro-Meningeal*, and the branch which is sent to the Involucrum, sometimes arise by a common stem, and sometimes arise as separate trunks from a neighbouring Artery; or where there are two neighbouring Arteries, it sometimes happens that two of the three arise from the one, and the remaining branch from the other.

(*o*) “ Major ramus est, qui Vertebrarum involucrum adit, “ aliis surculis, qua Corpora earum Medullæ respiciunt, et aliis “ per eam sedem, quæ spinis obvertitur. Varie vero in ramos “ ita distribuitur, ut quisque cum binis proximis, superiori et “ inferiori, et cum ramo sibi opposito, in Involucro arcus et “ retia faciat. *Confer. Winslow, iii. 119. Ea retia nimis uni- “ formiter Polygonia pinxit, Willisius. Tab. xiii. fig. 3. Ejus- “ modi vero rami ad Corpora Vertebrarum ab ipso atlante deor- “ sum ad coccygem usque reperiuntur, neque ullum intervallum “ ejusmodi trunculo desinitur.*”—*Haller, Fascic vii. p. 13.*

In his second Fasciculus, where Haller is treating of the Vertebral Artery, he describes the *Medullares* in the region of the Neck, as entering at every Inter-vertebral space, and as furnishing regularly their tributary supplies to both the *Sternal* and *Dorsal* canals of the Spinal Marrow; and Portal, in describing the Vertebral Artery, has not only represented the *Medullares* as entering at every Inter-vertebral space, but as regularly divided into four Ramuli, like the branches which are sent to the Involucrum. The account, however, which Haller has given in his seventh Fasciculus, and where he distinguishes the three sets of Arteries, is the most correct.

INTERCOSTALIS PRIMA, -

seu . . .

Intercostalis Superior,

CROSSES the central and concave aspect of the first rib, near its Vertebral extremity; and *peripherad* of the Pleura, is seen ramified on the first Costal interstice, generally on the second, sometimes on the third, rarely on the fourth. Throughout its course, it uniformly rests either on the ribs, or Intercostal muscles. Had it arisen from the arch of the Aorta, it must necessarily have stretched through a considerable intermediate space, without

any support, excepting from loose cellular membrane, and as the parts between which it extended might often have varied their relative position, in consequence of the different states of respiration, its functions had been more exposed to interruption, than in a situation where the parts of the course, over which it runs, combine in performing the same kind of motions. Had it arisen from the straight portion of the Aorta, it must have returned at a more acute angle, than any other of all the Intercostals; and although it be true, that even human sagacity itself could have devised different means by which such inconveniencies might be obviated, it is equally true, that no sagacity could have devised a course more secure, or an origin less exceptionable, than that which this Artery usually has from the Subclavian Portion of the BRACHIAL (*p*). With respect to its mode of ramification, it is similar to that of the other Intercostals, which shall afterwards be described in their proper place.

(*p*) Haller saw it rising by a common trunk with the Cervical Artery, and also by a common trunk with the Sacrothyroid; Eschenbach, by a common trunk with a Vertebral Artery; Ravius, by a common trunk with the Sternal, or Internal Mammary Artery. Winslow and Walter saw two Intercostals on the same side from the Brachial Artery, and P. C. Fabricius saw a case, where all the Intercostals were from the Aorta. See *Haller, Fascic. viii, p. 64.*

ARTERIA STERNALIS, (q)

seu

Mammaria Interna,

Rises nearly opposite to the *Sacrothyroid*, and near to the place where the Subclavian (*r*) is about to pass between the *Scalenus Anticus* and *Medius*. It enters the Thorax *peripherad* of the Pleura, and, nearly parallel (*s*) to the side of the Sternum, stretches across the first seven of the Costal Cartilages at a small distance from their mesial extremity. Where it reaches the place of the *Sternocostalis*, it runs *peripherad* of that muscle, perforates the Diaphragm, as it passes the Cartilage of the seventh rib, enters the Abdomen *peripherad*, also of the Peritoneum, and branching on the central aspect of

(q) I have borrowed this name from Portal, which he, by omitting the prefix *sous*, had borrowed from Chaussier.

(r) The cases are rare where the right Sternal has been seen rising either from the Aorta or Arteria Anonyma.

(s) If the course of this Artery, and the side of the Sternum, be viewed together, this account will not appear inconsistent either with the figure of Haller in his sixth Fasciculus, or with the account which is given by Murray, who says, "Ab origine ad costam tertiam, ad Sternum inclinatum, tum vero extrorsum sensim vertitur."

the Rectus, nearly as far as the *Umbilicus*, is observed to inosculate with different branches from the Epigastric.

While it runs in the vicinity, it generally sends branches to the Sternohyoideus, the Sternothyroideus, the neighbouring Lymphatic Glands, and the Clavicle. But passing through the Thorax, it always sends branches to the Sternum and Cartilages, to all the neighbouring parts of the ribs, and to the Intercostal muscles attached to them.

Crossing the first four of the Interstices, it often sends two branches to each, to inosculate with the Arteries named Intercostals, and with the branches from the Axilla, that are termed *Thoracics* (*t*). From some of these branches, as Ramuli have been found entering the Mammæ, and communicating with the Lactiferous Ducts, that circumstance has partly given rise to the name Internal Mammary (*u*).

(*t*) Speaking of these inosculation, Haller says, “ *Certe nihil pulchrius esse potest.*”

(*u*) “ *Plusieurs (Rameaux) parviennent dans le corps de la mamelle : mais ce ne sont pas les plus considerables, quoique ce soit d’eux que l’Artère a reçu le nom de Mammaire Interne.* Nuck a fait passer du mercure, par l’injection des Artères qui se repand dans les mamelles, dans les canaux lactés. et cette expérience a été depuis faite plusieurs fois. D’ailleurs, n’y a-t-il pas des femmes qui rendent du sang par la mamelle

Approaching the Cartilage of the sixth rib, the Sternal Artery sends off a large lateral branch; which, crossing the Cartilages of the false ribs, and coasting along the attachments of the Diaphragm, as far as the tenth, has received the name of *Musculo-Phrenic*. At each of the Interstices, which are here narrower, the *Musculo-Phrenic* sends off the branches that meet the divisions of the Intercostals on the Sacral and Atlantal margins of the ribs, and as these inosculate by their extremities with the divisions of the *Intercostals*, without changing the direction of their course, and without any sudden change of diameter, it is difficult to say where the inosculation takes place. The *Musculo-Phrenic*, from its situation, naturally sends numerous branches to the Diaphragm, and, though not so numerous, nor yet so large, branches also to the Transversus Abdominis, which have sometimes been seen extending *sacrad*, and inosculating with branches from the Lumbar Arteries.

The Sternal Artery having passed the Cartilage

“ au lieu de lait ? On en a vu qui étoient réglées par cette
“ voie.”—*Portal*. Vide Nuck’s *Adenographia Curiosa*, cap.
11. where he mentions the experiments, in which he made his
injections pass not only from the Arteries into the Lactiferous
Ducts, but from the Lactiferous Ducts into the Arteries.

of the seventh rib, and sent branches to the Ensiform Cartilage, sends off another lateral branch, not much inferior to what remains of the rest of the Trunk. This lateral branch is seen afterwards spreading on the central aspect of the Transversus Abdominis, and inosculating with Ramuli from the Epigastric (v).

The branches sent from the Sternal Artery to the adjoining Viscera of the Thorax, are branches ramified on the Mediastinum, the Thymic Glands (w), the Pericardium, and the branches that accompany the Phrenic nerve towards the Diaphragm. The branches, however, that happen to be ramified on these Viscera, are not so regularly from the Sternal Artery, as the previous branches to the *Parietes*. They sometimes have been seen arising directly from the Subclavian portion of the Brachial Artery,

(v) Mr. Burns acquaints me by letter, that he lately saw the Sternal Artery sending off a lateral branch at the place where it passes the first rib, and that this branch, not inferior in size to one of the Intercostals, extended as far as the fifth rib; and in a subject about 12 years of age, was three inches distant from the place where the ribs are joined to their Cartilages. In short, its course, on the central aspect, appears to have been opposite and commensurate to that of the *Arteria Thoracica Altera*, represented by Haller in his sixth Fasciculus, Tab. 1.

(w) “*Duas Thymi Glandulas esse, dudum, repetitis, admodum experimentis confirmor.*”—Haller, *Fascic. iii. p. 22.*

from the Arteria Anonyma, from the Cephalic, from the Aorta, and from one another (x).

Whatever be the origin or number of the *Mediastinal Arteries* (y), they are always small, when their ramifications are confined to the Mediastinum itself; but larger in cases where they extend to the Thymic Glands, Pericardium, or Diaphragm.

The *Thymic Arteries*, naturally vary in size and in number, according to the size and extent of the Glands on which they are ramified. In the adult, these Glands are not only proportionally, but absolutely smaller than they are in the Foetus, while, in some adults, scarcely a vestige of them remains. When extremely small, and almost obliterated, they are supplied by a Ramulus or two from the Sternal Artery, or from some of the neighbouring Arterial

(x) See Portal.

(y) “ Les *Mediastines* et les *Pericardines* ne peuvent guère se distinguer, parceque les mêmes branches se distribuent au Médiastin et au Pericarde; elles viennent de plusieurs endroits; c’est-à-dire, que la Thymique, la Mammaire interne, les Diaphragmatiques, l’Aorte, et les Intercostales les produisent: de sorte qu’il faudroit faire mention des Médiastines dans tous les articles, qu’on destine à ces vaisseaux. Dans quelle confusion cette methode ne nous jetteroit-elle point? Et ne vaut il pas mieux abandonner ces petites Artères. ou ne les indiquer que généralement?”—*Lieutaud Anatomie Historique.*

branches. When they extend, as they sometimes are observed to do, in the Foetus, *atlantad* as far as the Thyroid Glands, or *sacrad* nearly as far as the Diaphragm (*z*), they are naturally supplied with Arterial branches from various sources; and Haller has seen them receiving branches, not only from the Arteries already named (*a*), but from the Encephalics, or Internal Carotids, and from the Atlantals, or Superior Thyroids (*b*).

From the situation, and from the connections of the *Pericardium*, it cannot be surprising to the Anatomist, that it should occasionally receive branches from the Aorta, the Arteria Anonyma, the Subclavian Portion of the Brachial Artery, or the two

(*z*) “Solent autem Cornua Superiora Thymi, in recens nato, aut Fœtu, cuil ongissima sunt, ante venam Subclaviam sinistram adscendere, ut denique contingant Thyroideam Glandulam—Est ubi utrumque cornu retro Subclaviam adscendere vidi, quod rarissimum est.—Inferiora Cornua descendunt alias ad originem vasorum magnorum, alias ad medium Pericardium, alias, in Fœtu, pene ad septum transversum usque.”—*Haller, Fascic. iii. p. 23.*

(*a*) “Rarius est, a radice communi Subclaviæ dextræ et Carotidis Thymicam venisse dextram, bis tamen visum et bis ex trunco Aortæ continuo super Pericardium quod vix notatum reperio.”—*Haller, Fascic. iii. p. 25.*

(*b*) “Cornua Superiora plerumque aliquos ramos a Thyroideis superioribus habent in collo. A Carotide interna habuisse vidi sed hoc rarum est.”—*Ibid.*

Cardiacs, as well as from the Sternal or Internal Mammary ; or that the Ramuli of these branches, where they extend along the trunks of the large blood-vessels, or along the Pleura, should be found by injections to inosculate with the Arteries that are named Bronchials. Haller saw a case, where the right Phrenic, originating in the Abdominal Aorta, passed through the Diaphragm with the Vena Cava, branched afterwards on the Pericardium, and inosculated with the Artery that was seen accompanying the Phrenic nerve (c).

The *Phrenic Arteries* are properly those which are ramified on the Diaphragm, and one of the number is that which accompanies the Phrenic nerve, and thence called the *Comes Nervi Phrenici*, or sometimes *Pericardio-Diaphragmatica*. It generally rises from the Sternal Artery ; though, as Haller remarks, it is sometimes a branch from one of the *Thymics*. The other Arteries that accompany the Nerve for a certain way, but terminate before they extend to the Diaphragm, are rather *Pericardiac* than *Phrenic* branches (d).

(c) See Haller, Fascic. iii. p. 25. Not. 8.

(d) Almost every individual of the species may present varieties of Mediastinal, Thymic, Pericardiac, and Phrenic branches from the Sternal Artery. See Haller, Fascic. viii. Note 8.

SACROTHYROIDEA (*e*),

scu

Thyroidea Inferior,

RISES near the Sternal and Vertebral Arteries, and running *atlantad* by the Dorsal aspect of the Cephalic, and by the side of the Œsophagus and Trachea, terminates in the Thyroid Gland, and the Larynx.

In its course, it sends branches to the Trachea, to the Œsophagus, and to the neighbouring constrictors of the Pharynx. The branches which it sends to

To enumerate and describe them, may show industry, patience, minuteness, and accuracy, but not that kind of industry, patience, minuteness, and accuracy, that are ever to improve Anatomy, Surgery, or Physiology.

(*e*) A Sacrothyroid was seen rising from the arch of the Aorta, between the Arteria Anonyma and left Cephalic, by Neubauer, as quoted by Soemmerring, and once seen by Haller from the Cephalic. “Semel,” he says, “rarissimo exemplo, a Carotide “vidi natam.” I have seen both Sacrothyroids rising by a common trunk on the right side, and the left branch passing obliquely across the Trachea, where it would have been divided in tracheotomy. Haller mentions a case where the Sacrothyroid was scarcely to be seen, (*vix ulla esset*); Mr. Burns a case where it was wanting, and a case where it run on the Sternal aspect of the Cephalic. See *Burns's Varieties of the Larger Arteries*.

the Trachea, sometimes extend in a sacral direction to the Bronchial Glands; the branches ramified on the Thyroid Gland (*f*) inosculate with the branches of the Atlantothyroid of the same side, and with their fellows of the opposite side. The branches to the Larynx, are expended chiefly on the Thyro-arytenoids, and the Crico-arytenoideus Posticus.

THE OTHER ARTERIES DIRECTLY OR INDIRECTLY
FROM THE SUBCLAVIAN PORTION OF THE BRACHIAL.

THESE Arteries admit of no definite description as to their size, origin, or number, their course (*g*), or extent of ramification: Some of them branch on the Axillary Plexus, and the neighbouring muscles, some on the deep and superficial parts of the Neck, some

(*f*) Though the right and the left lobes of what is usually called the Thyroid Gland, be, in general, united on the Sternal aspect of the Trachea, yet there are cases, and these not a few, where no such union is to be observed, and where the right and the left lobes, are as evidently distinct Glands, as the two Parotids, or the two Kidnies, which two last are sometimes united on the Sternal aspect of the Lumbar Vertebrae, exhibiting a figure, though not strictly like, yet somewhat similar, on a slight inspection, to that presented by a horse shoe.

(*g*) The course of an Artery to any given part, must always, in some measure, depend on the situation or position of the place from which it originates.

on the Clavicle, the Scapula, the Trapezius, and the parts adjacent. Two or more of them have received names (*h*), in allusion to the direction of their course, their relative situation, or their destination; but scarcely do those of any situation, course, or destination, admit of the same uniform description in two individuals. Attempts to describe them by some specific and permanent characters have frequently been made, and as frequently have failed. The most accurate account of them seems to be, that the whole of the Neck is not supplied by the regular branches of the Pericephalics, nor the regular branches from the Subclavian Portions of the Brachials; but that several branches, directly or indirectly, from the Subclavian Portions of the Brachials, having no fixed or specific characters, are always ramified on the different aspects of the Cervical region; some of them meeting with branches

(*h*) Soemmerring has named one of these, *Arteria Scapularis Superior*, vel *Transversa Cervicalis Superficialis*, from being both a Cervical and a Scapular branch; and Murray describes a *Transverse Scapular*, which, in different individuals, varies the extent of its ramifications, and sometimes, changing the direction of its course, becomes a *Dorso-scapular*; but in no situation, and under no name, does it ever restrict itself to any regular or determinate laws, as to either the mode, the number, or extent of its ramifications.

proceeding from the Pericephalics towards the Atlantal part of the Neck ; some of them, towards the Scapula and Clavicle, inosculating with branches from the Axilla ; and of them, particularly an Anastomatic, of a large size, named *Superspinal*, passing under or above the Ligament of the Scapular Notch, and always inosculating, under the Acromion, with a branch reflected from the Subscapular.

Some of them are seen occasionally arising by a common trunk, with the Vertebral Artery, the first Intercostal, or the Sternal Artery ; although most commonly, when they rise not directly from the Brachial itself, they are seen rising by a common trunk with the Sacrothyroid. Hence Anatomists, since the days of Haller, have been puzzling themselves, and confounding their readers, by sedulously detailing the many varieties, and the many combinations of the Sacrothyroid, of which they have read, of which they have heard, or which they may have seen ; and it is not improbable, that future Anatomists of the like *genius, temper, and industry*, will, in searching for novelties, describe many more that have not yet been entered on record.

When the common trunk, that furnishes the whole, or a number of these branches, is once con-

sidered as the Sacrothyroid, we need hardly be surprised to learn, that sometimes the Sacrothyroid is larger than the rest of the Brachial Artery, and more particularly in young subjects (*i*), where the Atlantal or Superior extremities bear a less proportion than they do in the adult, to the several parts on which the Sacrothyroid itself, and these irregular branches, are ramified.

AXILLARY PORTION. (*k*)

This portion of the Brachial Artery is at its commencement surrounded by the Axillary Plexus of Nerves, by the Axillary Veins, the Axillary Glands, and the adipose substance, which occupies the space between the Pectoral and Subscapular muscles, and between these muscles and the Serratus Magnus. On approaching the Humerus, it runs between the Biceps and the long head of the Triceps Extensor, and may always be found beneath the Integu-

(*i*) “Thyroidea Inferior Arteria, toto in pueris reliquo trun-
co Subclaviæ major, proxime exterius, quam Vertebralis,
“oritur, eodem fere loco, quo Mammaria et Intercostalis Su-
“perior.—Hæc magna Arteria ab origine in tres vel quatuor
“ramos finditur.”...*Haller, Fascic. ii.*

(*k*) See page 53.

ments, the Fascia, and the Nerves, where it runs between the tendons of the Pectoralis and Latissimus Dorsi.

The branches which it regularly sends off, are certain branches named *Arteriæ Thoracicæ*, and a large branch named *Scapularis* (l). As for other two branches, usually called *Circumflexæ Humeri*, though regular in their general course and destination, they are not so constantly from the Axillary Portion as the common descriptions would lead us to suppose.

ARTERIÆ THORACICÆ.

In general, these Arteries are meant to include all the branches from the Axillary Portion, except the *Scapularis* and the two *Circumflexæ*. In their ramifications, they extend from the Deltoid and Subscapular muscles, as far as the Sternum, and from the Clavicle to the fifth rib. Towards the Clavicle and Acromion Process, where they spread on the Deltoid and Subclavian muscles, they inosculate with branches from the Subclavian portion of the Brachial. They supply copiously the Pectoralis, the Serratus Magnus, and often the Subscapularis,

(l) Subscapularis, Infrascapularis, or Inferior Scapulæ.

and in the interstices between the ribs communicate with branches from the Intercostals and the Sternal Artery, and with other branches of the Sternal Artery in the substance of the Mammæ. They sometimes arise by four, sometimes by six, and sometimes by more separate trunks, though these trunks when viewed in the species, have no regular nor determinate size, no fixed or relative proportion, or definite extent of ramification. In several cases, I have seen the greater number arise by a common trunk; and Murray observes, that what he denominates the *Longer Thoracic*, has sometimes been seen arising from the Circumflex, or Inferior Scapular (*m*). Some, more fond of prescribing to nature, than of allowing nature to prescribe to them, have chosen to restrict their number to four, the *Highest*, the *Long*, the *Humeral*, and the *Alar*, while others, as Bichât's Continuator, for instance, restrict them to three, the *Acromial*, the *External Superior*, and *External Inferior* (*n*). By these arbitrary limita-

(*m*) *Thoracica Longior*, seu *Thoracica Superior*, seu *Mammæria Externa*. Ex circumflexa vel Scapulari inferiori aliquando elevatur.

(*n*) The terms Superior, Inferior, and External, have often in this writer, an extremely vague sense. In another place, speaking of the branches of what he calls the *Inferior Scapulæ*, he observes, that one is *descendente*, ou *Antérieure*, another

tions of number, several branches from the Axillary Portion are left without a class, and without a name, and without a name they ought to have been left; as names and descriptions, implying general and permanent characters, where none are to be found, are the sources of error, but never of any important information.

The learned Portal, declining either to specify the number, or assign names to these varying and irregular branches, has chosen to divide them into three classes: the *Anterior*, the *Middle*, and the *Posterior*. His method is preferable to the one in use, but his terms denoting position are vague, and he does not seem to place that confidence on the accuracy of his own classification, that might have been expected; for what he calls the Posterior Thoracics, are among the branches which he afterwards calls the *Superior Scapulars*, and sometimes the

Transversale, ou Postérieure. Nor is Boyer more precise in the use of them. "Afin," he says, "afin d'indiquer plus exactement les rapports de l'Aillaire avec les parties voisines, nous y considerons quatre côtés, un supérieure ou *externe*, un inférieur ou *interne*, un Antérieur et un Postérieur." In this way of writing, it is difficult to say how many are the terms that may be synonymous with Superior, Inferior, External, and Internal. These words, employed to convey an indefinite number of indefinite meanings, may, in one respect, be classed with the words that convey no meaning at all.

Small Internal Scapulars (o). In all the accounts of these Arteries, where they are named and described separately, their particular distribution, in some individuals, is assumed as the ground work, and the varieties of other individuals, in the manner of Haller, are afterwards interwoven to supply the place of a general description ; but no varieties eked, interwoven, or huddled together, can answer that purpose. The details of varieties being only the materials for a general description, which should always express the characters of the species, without descending to the endless, jarring, inconsistent varieties of the individuals.

(o) “ Les Artères Thorachiques Postérieures, sortent de l’extrémité Externe et Inférieure de l’Artère Axillaire, et se répandent dans le muscle Sous-Scapulaire, en deux ou trois Rameaux, que l’on appelle quelquefois les *petites Scapulaires Internes*, pour les distinguer de la grande Scapulaire Externe. Il y a deux sortes d’Artères *Sous-Scapulaires*, les Supérieures et les Inférieures.

“ Les Artères Sous-Scapulaires Supérieures, sortent quelquefois de l’une des Artères Thorachiques, mais très souvent elles viennent du tronc de l’Axillaire même, elles parcourent le bord supérieure de l’omoplate, et fournissent des rameaux au muscles sur-épineux, au Sous-Scapulaire, et au petit Pectoral : Plusieurs Rameaux parviennent dans le Plexus Brachial, et aux Glandes Axillaires.”

ARTERIA SCAPULARIS,

Is the largest Artery which takes its origin in the Axilla, and, though not the only one, is nevertheless the principal Artery which belongs to the Scapula, and the muscles that rise from it. It sometimes originates among the Thoracics, but generally after them, at some more distant part of the course of the Axillary Portion, and not far from the tendons of the Pectoralis and Latissimus Dorsi. In point of magnitude, it does not appear much inferior to the *Humeral Artery*, and in those cases where it furnishes the deep and the two circumflex Arteries of the Humerus, is even larger. In different individuals, it is known to exhibit different varieties of ramification (*p*) ; but always sends branches to the Subscapular muscle, the Latissimus Dorsi, the Teres Major, the Teres Minor, and the Infra-spinatus ; sending often branches to the Axillary Glands, the Capsular Ligament, and to some of the tendons of the muscles attached to it.

(*p*) What Murray calls its *Ramus Muscularis*, for instance, is often wanting, and its place, partly and principally supplied by an Artery, which, in his language, is an Artery “ Insignis magnitudinis, et sæpe propriæ originis, in Subscapulari Arterias, ad basim usque Scapulæ prorepentes emittens, et porro “ ad Teretem Majorem, Serratum, Latissimum, Glandulasque “ alares surculos validos longe lateque dispergens.”

Of what might be deemed its regular branches, there are two comparatively large in size, the one I would call the *Sacro-scapular*, and the other is already known by the name of the *Circumflex Scapular*. The *Sacro-scapular*, continued somewhat in the course of the Trunk, extends nearly in the general direction of the Sacral or Inferior Costa of the Scapula, and after sending off a number of branches to the parts adjacent, is usually seen reflected *atlantalad* towards the base, and observed to inosculate with some transverse Cervical branches from the Subclavian Portion of the Brachial.

The *Circumflex Scapular*, still more regular in its appearance, is reflected over the edge of the Scapula; after passing the long head of the Triceps, and running underneath the Teres Minor and the Infraspinatus, is ramified copiously on these muscles; while in all the cases, where anatomists hitherto have accurately traced its ramifications, it inosculates freely under the Acromion with that branch of the Subclavian that is named Superspinal.

ARTERIÆ CIRCUMFLEXÆ.

ONE of these Arteries is named the *Anterior*, and the other the *Posterior*, not with a reference to the aspects of the Humerus, but to those of the Thorax.

They would be better named the *Thenal* and *Anconal*; however, taking the names as they are, the smaller of the two, named the Anterior, between the insertion of the Pectoral muscle and the Capsular Ligament, runs round by the *Thenal* aspect of the Humerus, to the groove that receives the tendon of the Biceps. In this course, it passes under the Coracobrachialis, and under the short head of the Biceps; send off branches to these muscles, and not unfrequently to the Subscapular, the long head of the Triceps Extensor, the Latissimus Dorsi, and sometimes to the Deltoid. It branches also on the groove itself, on the Tendons of the Biceps and Pectoral muscles, on the Periosteum and Capsular Ligament, inosculating by twigs with the other Circumflex, by twigs with the Circumflex Scapular branch, and by some twigs, even with the deep Arteries of the Humerus.

The larger Circumflex, named the Posterior, runs round in an opposite direction by the Anconal aspect of the Humerus, passing, in its course, between the head of the Triceps and Humerus, and between the Sacral Costa of the Scapula and Teres Major. It is principally expended upon the Deltoid; but sends, also, at times, small branches to the Subscapular muscle, the Coracobrachialis, the

Teres Minor, the Bicipital groove, the Periosteum and Capsular Ligament, inosculating with the branches of other Arteries that happen to be ramified on these parts.

With respect to their origin, these two Arteries are very irregular. They sometimes rise by separate trunks from the Axillary Portion ; sometimes, again, the one arises from the Axillary Portion, while the other arises from its Scapular branch ; sometimes they spring by a common stem from the Axillary Portion ; sometimes, again, by a common stem from its Scapular branch ; and sometimes the larger or Anconal branch, rises in common with the deep Artery of the Humerus.

THE HUMERAL PORTION.

THE Humeral Portion of the Brachial Artery commences where the Axillary Portion ends, and is usually described as extending thence to the bend of the arm, where it divides into the Radial and Ulnar branches. But this description, although consistent with the figures given by Eustachius and Haller, does not correspond with the appearances which the Artery often exhibits in the species. If the Humeral Portion is to be defined as terminating always in what are called the Radial and Ulnar branches,

there are many cases, where it must terminate near the Axilla, and at all the distances between that and the bend of the arm. On the other hand, if it be defined as always extending to the bend of the arm, one or other of the two branches, which are now denominated the Radial and Ulnar, must assume the name of Humeral Artery; so that the term *Humeral Artery*, or Humeral Portion of the Brachial Artery, must, at different times, be made to convey very different meanings (*q*). As for Hal-

(*q*) Portal is very confused and inconsistent in his description of this Artery, which he terms the Brachial. At one time, he makes it to terminate at the bend of the arm; at another, in what he calls the Radial and Ulnar branches; and, again, when speaking of the high division, he considers these branches as two Brachials.

“ Cette Artère, (l’Artère Brachiale,) qui est la continuation de l’Axilaire, est un peu moins grosse qu’elle; elle porte ce nom jusques vers le pli du coude, où elle se divise en deux Artères, qui vont à l’avant bras.

“ Le longueur de l’Artère Brachiale n’est pas toujours la même, se divisant tantôt plus haut, tantôt plus bas.

“ J’ai vu cette Artère se diviser elle-même en deux troncs, et former deux Artères Brachiales, et alors chacune d’elles alloit, en se prolongeant, former la Cubitale et la Radiale.”

Sabatier is equally inconsistent as Portal; for, although he describes the Humeral Artery as terminating regularly, and losing its name in the Radial and Ulnar, yet he afterwards speaks as if these Arteries were not entitled to assume the name, till they reached the fore-arm, that when they divide in the re-

ler's Figure of this Artery, and its ramifications, after what he has said concerning the principles on

gion of the Humerus, they form a double Humeral Artery, and, by parity of reasoning, would form, also, a double Axillary, and a double Subclavian, were they to separate in the region of the Neck.

“ Lorsque l'Artère Axillaire a donné naissance aux deux
“ Circonflexes, elle change de nom, et prend celui d'Artère Hu-
“ merale, qu'elle conserve jusqu'à sa division en Radiale et en
“ Cubitale.

“ L'Artère Humérale est une de celles qui présentent les
“ plus de variétés. On la voit souvent se diviser à la partie
“ moyenne, et à la partie supérieure du Bras. Monro l'a trou-
“ vée *double* dans un sujet, où l'Artère sousclavière produisoit
“ elle-meme les deux Artères Radiale et Cubitale.” I know
not the Monro, whose authority he has quoted in this instance.
In the second volume of the Edinburgh Medical Essays, the
first Dr. Monro of Edinburgh has given a figure, showing the
Humeral Artery dividing into what he calls the Radial and Ulnar
branches, “ as it is coming out of the arm-pit.” If this be
the case to which Sabatier alludes, he is very inaccurate as to
the idea which he entertains of it. I know, from inquiry, that
the present Professors, the son and the grandson of the first Dr.
Monro, have no where mentioned so early a commencement of
the Radial and Ulnar Arteries; and that Mr. Fyfe, who has
written on the Arteries, and is well acquainted with all the pre-
parations in the Anatomical Museum of Edinburgh, has never
seen so early a division of these branches. If the statement be
accurate, the Monro of Sabatier must, therefore, be different
from any of the three Professors of Edinburgh.

The appearance of a double Humeral Artery, is often occasioned by a branch arising from the Humeral Artery, near the Axilla, or, at least, high in the region of the Humerus; and

which he proceeded, it cannot be thought disrespectful or injurious to his high and justly acquired reputation, to say, it is not an accurate description of any appearance that is common to the species, nor, indeed, a description applicable throughout to any appearance that occurs in individuals, but merely a description of one of the occasional appearances of the Artery, along with varieties of ramification which he had observed at different times, and in different subjects, and from which he had formed that ideal combination, which the Figure represents. His honest and manly declaration of the motives by

which, after running in a parallel direction, enters the Humeral Artery again, or some of its branches, near the bend of the arm. In four preparations, that are now before me, this branch enters the Radial Artery: in three of them, opposite to the bend of the arm; in the fourth, some inches beyond it. In one, where it enters at the bend of the arm, it is as large from its very commencement as the Radial Artery, while the part of the Radial, interposed between it and the Humeral Artery, appears as it were a transverse branch, joining a Radial and Humeral Artery, that had previously separated near the Axilla. Mr. Burns calls these branches *Vasa Aberrantia*, and has five preparations in which they occur. (*See his Varieties of the Larger Arteries.*) The first Dr. Monro has delineated one in the second volume of the Edinburgh Medical Essays; and Haller, after speaking of such a branch, says, “*Aliquid huic fabricæ simile pingit Alexander Monro in Edinburg, Ess. T. ii. tab. ii. fig. 4. Ubi Arteria satis alto loco ab Humerali orta in Ulnarem in flexu Cubiti se immittit.*”—*Haller, Fascic. vi. p. 20.*

which he was actuated, in constructing that Figure, should exempt him from censure ; but in what manner shall we vindicate those, who, not looking beyond the Figure, have servilely described his ideal combination at the time they were pretending to be copying from nature, and thereby have led a number of others, who carelessly confided in their descriptions, to entertain the erroneous opinion, that the Humeral Artery, in size, distribution, and ramification, is remarkably regular throughout the species. Their several accounts, upon the idea that they were taken from actual observation, were naturally viewed as corroborative evidence of one another ; and, accordingly, the whole considered as a proof, that the Artery had the same, or nearly the same appearance and character, in all the individuals where it had been examined. So late even as the time of Camper, the figures, in both Eustachius and Haller, which were thought to be confirmed by these shadows of actual observation, are appealed to as evidence, that the high division of the Humeral Artery does not exist, or occurs but seldom (r). The

(r) “ Quum quinque ejusmodi exempla ad manus mihi sint,
 “ non possum non SHARPIO contra CAMPERUM adsentiri, qui
 “ quidem in *Demonstrationibus* Anatomico-Pathologicis, lib. i.
 “ p. 15. Ait. Sharpius Humelarem Arteriam supra cubitum

truth, however, is, the high division occurs so often, that we can hardly, with any propriety, call it an anomaly, or presume to mention the place or manner of the division that are common to the species (s).

“ non raro se dividere adnotat. Dubito vehementer, EUSTACHIUS illam non pingit, neque HALLERUS hujus naturæ locus mentionem facit, et si quid mea valet autoritas, fateor, me nunquam altius quam eam depinxi, divisionem in Radialem et Ulnarem vidisse.” Vide Soëmmerring in nota ad § cxlv. tom. v. *Fabric. Corporis Humani*.

(s) It would appear, that Camper, Soëmmerring, and my friend Mr. Burns, who thought Haller a stranger to the high division of the Humeral Artery, had either overlooked, or entirely forgotten, some of the observations, at least, that accompany his Figure, representing the divisions of this Artery. The truth is, Haller himself had not only seen the high division, but mentions a great variety of authors, who had seen it before him, and even some who thought it the general or common division.

“ Arteria denique *radialis*, directus Arteriæ *Humerariæ* et profundior finis, dunc dicenda superest. In fine *brachialis interni*, T. iv. fere oritur. Aliquoties tamen in summo humero et supra ipsum ejus caput natam vidi, quæ observatio ab ANDREA LAURENTIO ortum traxit, qui primus duplicem basilicam Arteriam vidit, profundam et subcutaneam, unde Arteria pulsans radii nasceretur, *Hist. Anat.* p. 146. Deinde ita frequenter hæc observatio BIDLOO obtigit ut tunc, cum Arteria *Brachialis* simplex esset, pro peculiari observatione haberet, ut ex IDONIS WOLFII, *Chirurgicis Observationibus* adparet, p. 64. Ideo enim credidit gangrænam ex operatione aneurismatis successisse, quod unica Arteria *Humeraria* foret,

By the Humeral Artery, or the Humeral Portion of the Brachial Artery, we are simply to understand that continuation of the Axillary Portion, from which the three Arteries of the fore-arm, the Radial, the

“ quæ soleat duplex esse. Nam hæc altera ratio est, quare re-
 “ centiores Anatomici minori cum metu Arteriam Humerariam
 “ ligent resecentve quod nempe sperent subsidio Radialem Ar-
 “ teriam fore, quæ superius et ad summum humerum sæpe pro-
 “ veniat. Sed ea spes certe per mea experimenta mediocris,
 “ est, cum rara ejus fabricæ exempla sunt, et multo frequenti-
 “ ora, in quibus Arteria Radialis a trunco in cubiti demum
 “ flexione decedit.

“ Eandem ejus originis, quam BIDLOUS, utilitatem vidit
 “ HEISTERUS in *Compendio Anatom.* n. 66. et in I. F. MOE-
 “ bii, *Obs. Medicis Miscellaneis Theoreticis et Practicis*, n. viii.
 “ et in *Disp. de Arteriæ cruralis vulnere periculosissimo feliciter*
 “ *sanato*, n. 37, 38. cum icone, ubi addit. communicare circa
 “ cubitum et apud ELIAM FRIEDERICUM HEISTERUM fili-
 “ um *de nova brachium amputandi ratione*, n. 31. ubi Arteriam
 “ nonnunquam brachialem in summa axilla findi, et radialem ad
 “ latus externum bicipitis descendere, hinc absque metu in aneu-
 “ rismate Arteriam Brachialem ligari posse scribit, cum alter
 “ æque fere grandis truncus radialis pro alendo brachio supersit,
 “ similis est observatio 1. ZACHARIÆ PETSCHÉ in *Sylloge*
 “ *Obs. Anatomicarum Selectarum*, n. 54, et J. B. WINSLOWI,
 “ n. 143, et WINKLERI, n. 49, et ALEX. MONROI, *Edinb.*
 “ *Ess.* T. ii. T. 2. f. 3. et JOANNIS PALFYN. *Anat. Chirurg.*
 “ T. ii. p. 272, (pro frequenti) et PHILIPPI AD. BOEHMERI,
 “ *Fascic. Observ. Anat. Præf.* p. xi. et J. ERNESTE HEBEN-
 “ STREIT, in *Prog. ad Diss.* HAHNII, p. vi. et viri Clari. P.
 “ CONRADI FABRICII in *Progr. ad Anat. Fæmin.* 1749. edito
 “ p. 13. In dextro etiam latere frequens esse, ut tribus digitis

Ulnar, and the Interosseal, derive their origin. The place and manner of that origin to be left undefined, as these differ in different individuals. In a rare instance, which I have seen; and which is still preserved in my collection, the three Arteries spring up together at the bend of the arm (*l.*) But if one of the three arise separately, as is generally the case, then the Humeral Artery, or what I would call the Humeral Artery, will afterwards terminate in the

“ sub ala a trunco axillari ramus magnus secedat, hospes olim
 “ noster H. F. LE DRAN non satis constanter observavit *Op-
 “ rat. de Chirurg.* p. 374. Aliter iterum ILL. TREWIUS non
 “ radialem solum ad summum humerum ortam, sed præterea
 “ duos ejus peculiare arcus vidit, unum in cubito cum ulnari, al-
 “ terum ad carpum cum interossea factum. *Comm. Nov.* 1737,
 “ p. 187. T. iii. f. 3. Alias in medio humero Radialis nascitur,
 “ quales ILL. HEISTERI altera observatio est, ut Arteria Ra-
 “ dialis ad finem deltoidis proveniret, ubi vox *usque* videtur super-
 “ flua esse. Talis est etiam observatio PETSCHII, n. 55. Es-
 “ CHIENBACHI. n. 1141, et WINKLERI, n. 50. quam fabricam
 “ etiam ipse vidi, et CL. DAUBENTON, *Descr. du Cabinet du
 “ Roi*, T. iii. p. 159, et J. ERNESTUS HEBENSTREIT qui
 “ Brachialem Arteriam ad insertionem Coracobrachialis musculi
 “ findi dixit, et CAS. CHRISTOPHORUS SCHMIEDEL. l. c. f. i.
 “ et n. 9.”—Haller, *Fascic. vi.* p. 33, 34.

(*l.*) In this case, the Radial and Ulnar Artery run superficially, *peripherad* of the muscles, but beneath the Fascia; and in the other arm of the same individual, the appearance is similar in every respect, excepting that the Ulnar Artery rises about a quarter of an inch *proximad* of the division into the Radial and Interosseal branches.

other two. Thus, for example, if the Radial Artery arise first, the Humeral Artery will terminate in the Ulnar and Interosseal; if the Ulnar Artery arise first, the Humeral will terminate in the Radial and Interosseal; or, if the Interosseal arise first, the Humeral will terminate in the Radial and Ulnar. The first case is common, the second is frequent, but the third is rare (*u.*)

(*u*) I have never yet seen this third species of division in nature, but have a drawing before me just now, that was sent by a friend, where the Humeral Artery, near the Axilla, sends off the Interosseal from its *Radial side*, and then separates at the bend of the arm, into the Radial and Ulnar branches. These two branches, as appears from the drawing, were *peripherad* of the muscles, though I cannot learn whether they were *peripherad* or *centrad* of the fascia. My friend Mr. Burns, also, writes me, that he has a preparation, where “the Humeral Artery, at the fold of the Axilla, divides into two branches, the deepest, which is nearest to the *Ulnar side* of the arm, is about the size of a crow quill, the other is somewhat larger; the first descends along the junction of the Brachiaëus Internus muscle, and the Triceps, gives off the Ramus Anastomoticus, and then dips under the heads of the Flexor muscles, beneath which it divides into the Anterior and Posterior Interosseal Arteries, and furnishes blood to almost all those muscles that usually receive it from the Ulnar Artery. The other, which is larger, descends along the Ulnar margin of the Triceps muscle, till it reaches the extremity of the Humerus. At this spot, it divides into the Radial and Ulnar Arteries, which are of equal size. The former vessel

In all cases, the Humeral Artery is immediately under the integuments and Fascia, situated on the Ulnar side of the Biceps; the Ulnar, also, and Interosseal, when they rise high, regularly continue on the same side. Nay, even the Radial, when it rises high, seldom, if ever, crosses the Biceps, till that muscle sends off the Tendinous Aponeurosis, which generally, if not always, protects this Artery, as it passes obliquely to its own side. Whatever be the branch, also, of the fore-arm, that is sent off in the region of the Humerus, it is rarely separated far from the Trunk (*v*). Of the three, however, the

runs in its usual course, the latter descends above the muscles; but the dissection being considerably advanced before I saw the arm, I cannot be certain whether it run above or below the Fascia. From its giving off none but Cutaneous ramifications, I believe it was placed above the Fascia."

The following case, quoted by Soëmmerring from Hildebrandt, is so vaguely described, that I scarcely know to which of the three kinds of divisions it belongs. "G. F. Hildebrandt " *Ramus Arteriæ Brachialis invenit, qui in superficie processus in Arteriam Radialem et Ulnarem dividebatur, quæ pari modo in Antibrachio superficiem tenebant, truncus autem Arteriæ Brachialis abibat in Arteriam Interosseam solito crassorem.*" In this case, did the three Arteries of the fore-arm arise together, or did one of them arise separately, and the trunk afterwards divide into the other two, or if it divided into the other two, into which two did it divide?

(*v*) The case seen by Elias Friedric Heister, the son, where there were two radial arteries, and where the smallest ran along

Ulnar, from its running occasionally *peripherad* of the Fascia, is that which admits of separation to the greatest distance. The separated branches run parallel, or nearly parallel, to the course of the Trunk, as far as the Distal extremity of the Humerus, unless that branch be the Radial Artery, arising from the Ulnar side of the Humeral, in which case, it crosses the Trunk on the *Dermal* aspect, to assume its regular place on the fore-arm.

After examining a variety of arms during dissection, comparing more than thirty-four dried preparations, and reading the Angeiological Descriptions of most of the writers since the days of Eustachius, I cannot discover among all the branches that are ramified between the Axilla and fore-arm, any that, in strict propriety of language, can be called regular; the PROFUNDA HUMERI, the ARTERIA NUTRITIA that penetrates the bone, and the branch, styled the RAMUS ANASTOMOTICUS, being regular only in a limited sense, when compared with the others that have still less of the uniform character.

the external or radial side of the Biceps, is certainly very rare.
See the previous note from Haller.

PROFUNDA HUMERI (*w*).

THE Profunda Humeri, frequently double, is the largest branch that is ramified between the Axilla

(*æ*) It has also been named the *Great Profunda*, to distinguish it from a branch of a smaller size, and a similar course, that has sometimes been described as a *Little Profunda*. What has been termed *Radial Profunda*, is a branch of the Profunda that happens to inoseulate with a Radial recurrent, “a Ramus Radialis communicans sive Ramus “Collateralis Radialis,” as Soëmmerring expresses it. What has been denominated *Ulnar Profunda*, is a branch either from the Humeral or Profunda, that happens to inoseulate with an Ulnar recurrent. In the language of Soëmmerring, “a Ramus “Ulnaris sive Cubitalis communicans sive Collateralis Ulnaris “sive Ramus Inferior.” The term *Inferior* bearing an allusion to some other branch of a like kind that he calls Superior.

From an idea that the Profunda runs somewhat parallel to the Humeral Artery, it has been named the *Collateral Artery*, the *Great Collateral*, the *Superior Collateral*, the *External Collateral*; *Great Collateral*, with a reference to a smaller Artery or Arteries, thought Collateral also; *Superior Collateral*, with a reference to the same Artery or Arteries, as arising after it; *External Collateral*, from its extending to the Radial or External side, in contradistinction to the Collaterals, which continue on the Ulnar or Internal side. When two small Collaterals are described, the Great Collateral is then the Superior and External Collateral, to distinguish it from the first of the small Collaterals, which is then the Superior and Internal; Superior, with respect to its fellow beyond it, and Internal, with respect to the Great Collateral that extends its course to the Ra-

and fore-arm (*x*.) It rises generally from the Humeral Portion of the Brachial Artery, near its commencement ; sometimes from the Scapular Artery ; sometimes from the Scapular Circumflex ; and sometimes from the Posterior or Anconal Circumflex. It is not only irregular in its origin, and mode of origin, but in its size, and in the number of its ramifications. Its permanent characters are to be found principally in its course. It enters generally, if not always, between the second and third head of the Triceps (*y*) ; winds round in a spiral manner, accompanying, for a while, the Radial nerve, and at last terminates in small branches,

dial aspect. One of these small Internal Collaterals is what some denominate the Ulnar Profunda. It may fairly be questioned, whether Anatomists, in describing these Arteries, were ever surpassed by the builders of Babel, in their confusion of language and ideas ?

(*x*) “ Plerumque a singulari trunco provenit et non raro duobus. Omnium Ramorum in humero natorum maxima.”—*Haller, Fascic. vi. p. 18.*

(*y*) Haller, in speaking of its course, says, “ Provenit ad “ imam oram Teretis Majoris cum Latissimo conjuncti et continuo, se inter brevem longumque extensorem abscondit.” But this language is not to be understood, as if it passed to the Radial side, between the first and second head of the Triceps ; the figures to which he refers shew the contrary ; and he afterwards adds, “ Inter Brachialem externum et brevem Circumflectitur, circa Os Humeri, comes Nervi Radialis.”—*Fascic. vi. p. 18, 19.*

near the Radial condyle, where it communicates with radial recurrents. In the progress of its course, it is seen communicating with branches from the Humeral Artery ; near its commencement with branches from the Axillary, and, not unfrequently with Ulnar recurrents, by means of a branch, or sometimes branches, that it sends off before it turns round the Anconal aspect.

It is differently ramified in different individuals, and is always proportionally larger or smaller, according to the number and size of the branches which it distributes to the Integuments, Periosteum and bone, and the several muscles that wholly, or in part, are adjacent to its course ; as the *Teres*, *Deltoid*, the *Biceps*, *Triceps*, the *Coracobrachialis*, the *Brachieus*, the *Radial Extensor*, and the *Supinator Radii longus*.

ARTERIA NUTRITIA HUMERI.

THE name which is given to this Artery would seem to imply, that it exclusively enters the *Humerus*, and supplies it with nourishment ; though the fact is, that Arterial branches, conveying a red or transparent fluid, may be traced, by injection, entering the *Humerus*, and every other bone of a

large size, at various places, and in great numbers, towards their extremities, where they are articulated with other bones.

An Arterial branch, if it enter the Humerus on the Thenal aspect, and near to the middle, where the structure is particularly hard and compact, if it be not a small Capillary branch, but a branch of a much superior size, easily discernible by the naked eye, and easily distinguished, on account of its magnitude, from all the branches that penetrate the bone immediately around it, that branch is the Arteria Nutritia Humeri, the Nutritia Magna, or Arteria Medullaris, as it sometimes is called, from spreading on the Marrow or Medulla of the Humerus.

Ere it reaches the bone, it often sends branches to neighbouring muscles and the Periosteum, and on these parts is differently ramified in different individuals. It is not always a regular branch of the Humeral Artery (*z*); it sometimes springs from one of the branches in the vicinity of the place where it enters; it is sometimes wanting (*a*), and instead of

(*z*) “Alias *Nutritia* propago Rami est, qui altera Profunda vocari potest.”—Haller, *Fascic.* vi. p. 21.

(*a*) There are many Humeri, where no canal, for the admission of any Artery answering the description, can be discovered.

one, there are sometimes two (*b*), which, from their size, and the place where they enter, appear to have an equal claim to the title.

In all cases, the Nutritia Humeri entering the bone in a slanting direction, from the Thenal aspect, regularly points to its Distal extremity, while the Nutritiæ of the Ulna and Radius, entering also in a slanting direction from the Thenal aspect, as regularly point to the Proximal extremities of their bones. In short, the Nutritiæ of these three bones point to the elbow joint. In the Sacral extremities, the corresponding Nutritial Arteries, which regularly enter in a slanting direction from the Popliteal aspect, run *proximal* in the Femur, and *distal* in both the Tibia and Fibula ; or, in other words, they point from the knee joint.

On comparing the extremities, Atlantal and Sacral, and seeing the different directions of these Arteries in the bones which correspond, and their similar directions in the bones which do not, are we to infer, that these directions are regulated by certain positions or attitudes adopted in standing, sitting, or

(*b*) “ Duo Rami Nutritiæ, et duos aliquoties vidi, duobus
 “ valde vicinis locis in Os Humeri descenderunt.—Nutritia
 “ Winkieri, n. 18. Sub ea Nutritia nonnunquam altera Nu-
 “ tritia sequitur, æque magna.”—Haller, *ibid*.

lying (c) ? or will it be thought more natural to suppose, that, as in the Teeth, these Arteries point towards the extremity where the bone is first completed in its growth, and first assumes that hardness and form to which it is destined. The Analogous Arteries in the Cow and the Horse, slant very little on entering the bone, and occasionally appear as if they entered in a direction perpendicular to the axis.

RAMUS ANASTOMOTICUS

RISES generally from the Humeral Artery, but sometimes from the Ulnar (*d*) ; sometimes from the parallel re-entering branch, called Vas Aberrans (*e*) ; and sometimes, also, from the Interosseal (*f*), when that rises high in the region of the Humerus, and runs nearer to the Ulnar aspect, than the common trunk of the Radial and Ulnar. From whatever source it derives its origin, it rises always a little *proximal* of the joint of the elbow ; rises re-

(c) If they relate to any positions, it must be to those which were previous to Birth.

(d) See Burns' Varieties of the Larger Arteries.

(e) See Note, page 99.

(f) See Note, page 104.

gularly from the Ulnar side of its parent trunk ; runs, for a little, to the Ulnar aspect, then branches out in various directions, inosculating with branches from the Profunda, and with recurrent branches from the fore-arm ; some of them ascending by the Thenal aspect, and some ascending by the Anconal, between the Ulnar Condyle and Olecranon. It is named Ramus Anastomoticus, not as the only Anastomotic ; and Ramus Anastomoticus Magnus, not as a great Anastomotic ; but considering its size, and the number of its branches, because it inosculates more frequently, and on more aspects, by free and obvious communications, than any other branch usually assigned to the Humeral Portion of the Brachial Artery. When named the Anastomoticus Major, it is named improperly, as from this name the young Anatomist is led to expect a Ramus Anastomoticus Minor, and must be disappointed in his researches, if he looks for such in the catalogue of Arteries belonging to the Humerus. Haller found it a constant branch (g) ; I have occasionally found it wanting ; and Soëmmerring, who also found it

(g) "*Anastomoticus* Ramus communis Utrique Brachialium musculorum, Interni et Externi, *perpetuus* et notata dignus ob conjunctiones varias, quas cum Arteriis inferioribus habet."—*Fascic. vi. p. 21.*

wanting, has described the manner in which he saw the deficiency supplied (*h*).

RADIAL, ULNAR, AND INTEROSSEAL ARTERIES.

As the permanent characters of these Arteries are not to be found in either the place or mode of their origin, we must try to discover them in either their course, their general destination, or their mode of distribution (*i*).

(*h*) “ Ubi Ramus iste Anastomoticus interdum deficit, ab arcu aliquo suppletur, qui e surculo rami pro ventre externo tricipitis brachii surculoque Arteriæ Humeri Profundæ ortum trahit; nunquam vero desunt Anastomoses Majores a fronte a tergo minores.”—*Soëmmerring, Fab. Corpor. Human.*

(*i*) In trying to form a clear, precise, and steady idea of these Arteries, Anatomists seem to have experienced as great a difficulty, as in trying to form a clear, precise, and general idea of the Humeral Artery. Mr. Bell's language is, “ The Humeral Artery having left this most critical point at the bending of the arm, divides into three great branches, the RADIAL, ULNAR, and INTEROSSEOUS Arteries; at least, the Ulnar gives off the Interosseous so soon, and the Interosseous is so large, and has so pointed a destination, that I take the privilege of describing the three branches apart.

“ The Radial Artery goes off like a branch from the Ulnar; or, in other words, the Ulnar seems to continue in the course of the main Artery, while the Radial goes off to one side.

“ The Interosseous, again, is truly a branch from the Ulnar; it comes off where the Ulnar lies deepest.

The Radial Artery, whatever be the place or mode of its origin, is always to be found towards the Radial side of the fore-arm, running generally, and with few exceptions, between the Supinator Radii Longus, the Flexor Radialis, and peripherad of the Flexor

“ These are the great divisions of the Artery,” (namely the Humeral.)

Portal describes the usual division of the Humeral Artery, into what are called the Radial and Ulnar branches, as a little above the bend of the arm ; and, like Mr. Bell, afterwards talks of the Radial Artery, as being sometimes a branch of the Ulnar.

“ L'Artère Brachiale parvenue ordinairement, comme il a été dit, un peu au-dessus du pli du coude, se divise en deux branches principales qui descendent sur l'avant bras, dont l'une est appelée *Cubitale*, parcequ'elle suit d'assez près le Cubitus, et l'autre est appelée *Radiale*, parcequ'elle correspond au Radius; *celle-ci est quelquefois une branche de la Cubitale.*”

Speaking of the place, where the Humeral Artery divides into what are called the Radial and Ulnar branches : “ About an inch, says Mr. Fyfe, below the elbow, it commonly divides into two principal branches, the Radial and Ulnar. It happens, however, now and then, that this division takes place directly over the joint of the elbow ; at other times, about the middle of the arm, and not unfrequently as high as the Axilla.”

When the Humeral Artery divides high, Anatomists describe it as dividing into the Radial and Ulnar branches, although there be always one of the two, that is, strictly speaking, neither Radial nor Ulnar, but the common trunk of the Radial and Interosseal, or the common trunk of the Ulnar and Interosseal. If the Humeral Artery terminate regularly in the Radial and Ulnar branches, it is impossible that one of these branches can

Longus Pollicis. On reaching the Distal extremity of the Radius, it leaves the Thenar aspect of the arm; runs *anconad* under the Abductor and Extensores Pollicis; passes to the *Vola*, between the Metacarpal bone of the Thumb and fore-finger; and

rise before the other, and yet Anatomists speak as if sometimes the Radial, and sometimes the Ulnar rose highest in the region of the Humerus. When they use this language, they forget their own definition of the Arteries, and secretly view the common trunk as the Humeral Artery, while they call it by the name of the Radial or Ulnar. This inaccuracy of thought and conception, must necessarily lead to inconsistency and confusion of expression.

“In three subjects, who were females,” says my friend Mr. Burns, “the Humeral Artery did not divide till it came near to the bend of the arm; as soon as it had divided, the Ulnar Artery, instead of passing beneath the Flexor Muscles of the Carpus, perforated the Fascia, and attached itself to the Basilic Vein, along which it descended towards the wrist.” “We know that this vessel (the Ulnar Artery) when it rises high, lies above the Fascia.”—*Burns' Varieties of the Larger Arteries*.

In these passages Mr. Burns means by the Ulnar Artery, the Ulnar Artery strictly so called. But in other passages, where he speaks of the Ulnar Artery as running regularly beneath the Fascia, he, in compliance with the usual custom, calls that the Ulnar, which being the common trunk of the Ulnar and Interosseal, should properly be called the Humeral Artery. With this explanation, the reader will understand the following passages, and, at the same time, see the importance of giving to each technical term a definite meaning, and of never varying that meaning, without a previous warning to the reader, or the person addressed.

then in a course directed *ulnad* across the Meta-carpals, and close to their surface, forms a curve on the Volar aspect that is convex *distad*, and which has been named the *Deep Volar Arch*.

“The Radial Artery seldom comes off higher than the fold of the Pectoral Muscle, but often much lower; and in all the specimens of this *lusus* in our possession, we have found both the Radial and Ulnar, (*i. e.* the Radial and the common trunk of the Ulnar and Interosseal) Arteries, covered by the Fascia. As I have now examined above twenty-six cases, and have invariably found the vessels below the Fascia, I have less hesitation than I otherwise would have, in supposing that Mr. Bell’s description of this *lusus* is incorrect.”—*Burns’s Varieties of the Larger Arteries*.

“If it be remembered, that the Radial Artery, when it comes off high, is uniformly covered as well as the Ulnar,” *i. e.* the common trunk of the Ulnar and Interosseal, “with the Fascia, and if it be stated, that almost invariably when the Ulnar Artery,” *i. e.* the Ulnar, strictly so called, “originates high, it descends above the Fascia, we shall be enabled to explain some phenomena, which are sometimes seen when the Brachial vessels are wounded. The fact of both vessels lying beneath the Fascia, when the Radial Artery rises high, and the Ulnar,” *i. e.* the Ulnar, strictly so called, “when it comes off high, running more superficial than the Fascia, are points highly necessary to be kept in recollection.”—*Burns’s Varieties of the larger arteries*.

In short, Mr. Burns always found the Radial Artery, and the common trunk of the Ulnar and Interosseal, covered by the Fascia; but the Ulnar, strictly so called, often above the Fascia. The language of Andreas Laurentius, who speaks of the high division of the Humeral Artery, which he calls the Basilic, and of the Radial Artery, as being its subcutaneous branch, implies

The cases are rare, and extremely rare, where it passes obliquely across the Radius, and *peripherad* of the Fascia, to that place between the Metacarpals from which it afterwards penetrates to the Vola. So far as I know, they are generally cases, where the *Superficial Volar branch* rises high in the region of the arm, and rivals somewhat the appearance of the Trunk, from which it originates (*k.*)

nothing that is clear or precise, as to the course of the Radial Artery. “Basilicam etiam duplicem observamus profundam et “subcutaneam: Utraque varios ex se diffundit Rivos; est ta- “men subcutaneæ surculus quidam, in Carpo conspicuus, quo “loco pulsum differentias, admota manu, explorare solemus.”—*Hist. Anat. Lib. iv. Cap. x.* The passage quoted from Elias F. Heister, by Haller, and where it is said, that the Radial Artery runs *distad* upon the external side of the Biceps, determines as little with respect to the question: whether did it run *peripherad* or *centrad* of the humeral Fascia?

(*k.*) Mr. Burns has observed several cases of the high origin of the *Volar branch*, and mentions one where the Physician had mistaken it in his patient for the Radial Artery, and on its weaker and tremulous pulsation, had founded the Rationale of his practice. Had he moved his fingers along the Radial side of the Radius, he might probably have felt the Radial Artery itself, where I have felt it oftener than once, pulsating immediately under the Integuments, or under the Fascia, but if under the Integuments only, not very steady in its situation. The language of Portal evidently implies, that he too has remarked this high origin of the *Superficial Volar branch*.

“Cette Artère (l'Artère Radiale,) se detourne aussi quelque fois; au lieu de passer sur le Bord interne et Antérieure du

The Ulnar Artery varies its course according as the Humeral Artery terminates: When the Humeral dips with the Tendon of the Biceps under the Sublimis, and terminates in the *Ulnar* and *Interosseal*, the Ulnar Artery, with several deflexions, runs *ulnad* and *distad* between the Sublimis, the Profundus, and Flexor Ulnaris; on approaching the Carpus, gradually becomes more superficial; under the Fascia, runs close by the Radial side of the Os Pisiforme; and from thence, beneath the Aponeurosis Palmaris, towards the Radial side of the Carpus, when it generally forms a species of curve that is convex *distad*, and which has been named the *Superficial Volar Arch*.

On the contrary, when the Humeral terminates in the *Radial* and *Interosseal*, the course of the Ul-

Rayon, elle passe sur le Bord Antérieure externe; et il n'y a alors qu'une petite Artériole qui marche dans la direction du Tronc." He adds, "Ce sont des variétés sans doute, mais qu'il est d'autant moins inutile de connoître, que c'est sur cette portion de l'Artère Radiale, que l'on tâte le Pouls, et que c'est après les connoissances acquises de cette manière que l'on se dirige pour le diagnostic, le pronostic, et pour le traitement de la plupart des maladies. Mais est-ce seulement lorsque l'artère Radiale se dilate, ou qu'elle est en diastole, qu'elle frappe les doigts du medecin qui explore le Pouls; ou n'est-ce pas aussi en se déplaçant dans sa totalité par son mouvement de locomotion qu'elle agit sur eux? C'est-ce qui n'est pas parfaitement connu."

nar is generally different ; it rises high, runs superficially above the muscles, not unfrequently above the Fascia, and, on the fore arm, somewhat nearer to the Radial aspect than when it lies deep. On approaching, however, the bones of the Carpus, it is generally found under the Fascia, running close by the Radial side of the Os Pisiforme, and if not forming a Superficial Volar Arch, at least, spreading into Volar branches beneath the Aponeurosis Palmaris.

The character, therefore, of this Artery is, that whether it originate in the region of the Humerus, or of the fore-arm, whether its course be superficial or deep, it is always found on the *Thenar* aspect, running close by the Radial side of the Os Pisiforme, and spreading into branches beneath the Aponeurosis Palmaris (*l*).

(*l*) From an idea, that the Ulnar Artery must always run deep beneath the Pronator and the Sublimis, Sabatier mentions a case, where, in his opinion, there were two Ulnar Arteries: an Anomalous Ulnar, running superficially beneath the Integuments, and forming the Superficial Volar Arch; and the true Ulnar, terminating in small branches at the Carpus. This true Ulnar, I will venture to say, was the Interosseal, the only Artery of conspicuous size, which he could find in that situation, where he had been looking for the true Ulnar. “ J’ai vu cette
 “ Artère, (l’Artère Humérale,) produire une Radiale et une Cubitale à l’ordinaire, et une seconde Cubitale qui descendoit

The Interosseal (*m*), by which I mean the Great Interosseal, for sometimes there are more Interos-

“ derrière les Téguments, le long du bord interne de l'avant
 “ bras, jusqu'au poignet, où elle fournissoit l'arcade Palmaire,
 “ pendant que la vraie Cubitale s'y terminoit par des branches
 “ très petites.”

(*m*) Mr. Bell says, that this is truly a branch from the Ulnar Artery; but, because it is so large, and because the Ulnar gives it off so soon, he takes the privilege of describing it apart, as one of the three great branches of the Humeral. See Note, p. 114. Sabatier, who considers it as a regular branch of the Ulnar Artery, is rather surprised that it sometimes should appear as a regular branch of the Humeral Artery. “ Quelquefois, au lieu
 “ de se partager en deux branches, elle (l'Artère Humérale) en
 “ donne trois, dont une va se continuer le long de l'avant bras,
 “ sous le nom d'Interosseuse Interne.” He had seen the division mentioned in Note, page 103.

Portal, although he describes it as a branch usually from the Ulnar Artery, acknowledges, that sometimes he had seen it rising from the Radial Artery, and sometimes from the Humeral. What he means by adding, that he sometimes had seen it arising even from the Trunk of the Ulnar Artery, is not easily conceived. “ L'Artère Cubitale, près de sa sortie de la Brachiale,
 “ donne de son bord postérieure une grosse Artère, qui sort
 “ aussi quelquefois de l'extrémité du tronc de l'Artère Bra-
 “ chiale, ou même de l'extrémité supérieure de l'Artère Ra-
 “ diale.—C'est l'Artère Interosseuse Interne; je l'ai vu sortir
 “ du tronc même de la Cubitale.”

I cite the following passage from Haller, for two reasons; *first*, to show that he had seen the Interosseal Artery extending its ramifications to the fingers; and, *secondly*, to prove, by a single example, out of many that might be collected from his sixth Fasciculus, that he used the terms *Radial* and *Ulnar*, to

seals than one, whether it arise from the Humeral separately, or terminate the Humeral along with the Ulnar, or along with the Radial, or along with the Radial and Ulnar together, is always seen on the Thenar aspect in the middle, between the Radius and Ulna; always deeper than the Sublimis, always extending some of its branches as far as the Carpus, though seldom so far as the points of the fingers.

In rare cases, where it runs immediately under the Sublimis, and extends to the fingers, there is usually another Interosseal Artery, either a branch, or a separate Trunk, between the Sublimis and the Flexor Longus Pollicis; an Interosseal which sends off most of the branches that pass through the Ligament, though often one of the perforating

denote position, agreeably to the manner which I have proposed in my Nomenclature. “ Non penitus omittere visum est, mirificam varietatem, quam semel omnino Anno 1745, M. Septembri vidi. Ex ipsa fere origine Arteriæ Interosseæ Ramus provenit, sodalis mediani nervi, inter Sublimem et Profundum flexorem, quorum utrique dedit, venitque cum ipsis, *ad latus Radiale* medii Digiti et *Ulnare* Indicis, dedit ramum pollicis abductoris, inosculatum *Radiali* Arteriæ Pollicis et una cum ea Arteria *Ulnarem* Pollicis et Arteriam *Radialam Volarem* Indicis constituit. Semel etiam ex ipsa origine Arteriæ Interosseæ ramum prodijisse vidi, qui ad volam venit et superficiei arcum constituit, qui solet a Radiali nasci.”—*Fascic. vi. p. 33.*

branches, named the Superior Interosseal Perforant, arises from the Humeral Artery, after passing the joint.

RECURRENT BRANCHES OF THE RADIAL, INTEROSSEAL, HUMERAL, AND ULNAR ARTERIES.

THE first branches *distad* of the elbow, that are sent off from these three Arteries, are certain branches which are named *Recurrents*. It was formerly observed, that one great difference between the ramifications of Plants, and the ramifications of Vascular Systems in the Animal kingdom, consisted in this, that the branches of the same Vascular System, when they are near, or when they are ramified on the same organ, are often observed to unite and separate, and to unite and separate again, forming a kind of Retiform textures that are called *Plexuses*. In these Plexuses many of the Ramuli are so minute, that, in their natural and healthy state, they convey only a transparent fluid, and are not to be discerned by the naked eye, unless when they happen to be filled with red blood, or with coloured injection, and then the parts on which they are observed, appear as if chiefly composed of vessels. When impediments, however, or any obstructions,

partial or complete, chance to take place in the circulation of the larger vessels, from which they immediately or ultimately spring, the smaller branches, if they be necessary to preserve the circulation, are gradually enlarged, and their Anastomoses or inosculations soon grow conspicuous. Such enlargements, and such conspicuous inosculations, should naturally occur at the bend of the arm, where the circulation is apt to be impeded, in the larger vessels, from the frequent extensions and flexions of the joint. In most cases, we accordingly observe distinct and obvious inosculations between the branches of the Profunda and Anastomotic on one side, and certain recurrent branches from the Radial, the Interosseal, the common Trunk of the Ulnar and Interosseal, and from the Ulnar itself, (n) on the other. These recurrents are to be seen on all the four aspects of the arm, the *Radial*, the *Ulnar*, the *Thenal*, and *Anconal*, though, from the varieties in the division of the Humeral Artery, they are subject to changes in size, origin, distribution,

(n) If the Ulnar crosses the joint superficially, it has no recurrents running upon the Anconal aspect, nor are those on the Thenal very conspicuous, from its circulation, in that case, being less impeded by the motions of the Joint. Portal, speaking of its recurrents, observes, therefore, “ Le nombre n'est pas bien fixé,”

and number: unsteady as they happen to be in these respects, Anatomists generally describe them with minuteness, on account of the confidence which they give to Surgeons in performing the operation for Aneurism near the bend of the arm. And yet Surgeons should know, as many of them do know, that the numerous small inosculating Ramuli, are in every part ready to enlarge, to become conspicuous, and, if proper time be allowed for the change, to continue the circulation of the blood, when the circulation in the Trunk of the Artery, or in its larger communicating branches, happens to be much impeded or obstructed. It implies, therefore, nearly as great an ignorance of the structure, to repose implicitly the whole of our confidence on these conspicuous inosculating branches, as it would to place it chiefly or entirely on the high divisions of the Humeral Artery (o.) In any case, should it be thought that the small lateral communicating branches are not, at the time, sufficiently large to convey the necessary supply of blood, after the

(o) Sharp did not trust entirely to the high division of the Humeral Artery. His expression is, "If the Humeral Artery happens to divide above the elbow, *which is not very uncommon*, the prospect of cure is better, and the pulse will be stronger after the operation."—*Treatise on the Operations of Surgery*, ch. xxxvi.

Trunk of the Artery is tied, they may, preparatory to the operation, be gradually enlarged by the previous and gradual compression of the Trunk forcing the blood into lateral channels, and gradually enlarging their communications (*p.*)

THE BRANCHES OF THE RADIAL, ULNAR, AND INTER-OSSEAL ARTERIES, UPON THE FORE-ARM.

THESE branches are so very irregular in situation, size, number, and distribution, that very few of them have obtained names, and are of so very indefinite a character, that they hardly are entitled to definite appellations. In strict propriety, therefore, it can only be observed in general, that the Radial, Ulnar, and Interosseal Arteries, as they are advancing towards the Carpus, not only supply the different parts on the *Thenal* aspect, but also send branches to the different parts upon the *Anconal*; the Radial Artery sending branches round by the Radial aspect, the Ulnar round by the Ulnar aspect, and the

(*p.*) “ Il paroît démontré,” says Portal, “ que des compressions douces antécédentes peuvent déterminer le sang à fluer dans les vaisseaux collatéraux, et les dilater graduellement. On à tiré, dans ces derniers temps, un grand avantage des compressions dans le traitement des Anéurismes.” — *Portal de l'Artère Brachiale.*

Interosseal, or Interosseals, through passages in the Interosseous Ligament.

RAMIFICATIONS OF THE RADIAL, ULNAR, AND INTER-
OSSEAL ARTERIES, ON THE CARPUS AND FINGERS.

THE varieties of Arterial ramification, particularly on the Volar aspect of the Carpus, are more numerous than on any other part throughout the whole *Atlantal* extremity ; the great number of voluntary motions, and the great variety of arts and employments in which the hand is so frequently occupied, naturally producing in those parts, not only varied, but extensive motions.

Upon the Anconal aspect of the Carpus, such varieties are less conspicuous, and less numerous, the parts there being less copiously supplied with blood, and less exposed to those partial, but not unfrequent interruptions of function that arise from pressure ; an exemption from pressure, which, though only comparative, may not improbably be one of the reasons that most of the larger Subcutaneous veins returning the blood from the Digital Arteries, return it by the Anconal aspect.

With respect to the Arteries that are named *Digital*, though unsteady in their origin, they are ge-

nerally regular as to their course, as well as to the place and mode in which they terminate; being very limited in their lateral range, they are always to be found running on the Radial and Ulnar sides of the Flexor Tendons, and regularly occupying that very space, where they are least exposed to the accidents that might have a tendency to injure their structure, or impede their functions.

RAMIFICATIONS ON THE VOLAR ASPECT OF THE CAR-
PUS AND METACARPUS.

WITHOUT descending to any unnecessary or minute detail, concerning these ramifications as they occur in different individuals, I shall mention only the several classes under which I think their general distribution may naturally be arranged.

In one class, the Ulnar Artery, passing the side of the Pisiform bone, turns *radial* under the Aponeurosis Palmaris, and forms a curve that is convex *distad*; from the convexity of this curve, a number of Volar branches proceed, which Volar branches, running as far as the Distal extremity of the Metacarpus, are seen continued, or are seen dividing into Digital branches, supplying the Thumb and the different fingers.

Of these Volar branches, it may also be observed, once and for all, that whenever they run towards an interstice, between two fingers, they generally divide into two branches, a *Digito-Radial* running on the finger that is situated *ulnad*, and a *Digito-Ulnar* running on the finger that is situated *radiad*.

In a second class, a *Thenal* branch (*q*) from the Radial Artery, running most commonly above the Transverse Ligament of the Carpus, though sometimes under it, meets and inosculates with the Ulnar Artery beneath the Aponeurosis Palmaris, and completes the arch from which these Volar branches originate.

In a third class, the Ulnar Artery turns but a little to the Radial aspect, under the Aponeurosis Palmaris, where the *Thenal branch*, from the Radial Artery, inosculates with it, and forms an arch, from which is derived only a part of these Volar Arteries,

(*q*) This is the *superficial Volar* branch of the Radial Artery, as it is called, but improperly called so, as it runs occasionally under the Ligament. It sometimes rises near the bend of the arm, and is as large as the Radial itself; at other times, it is so very small, as not to extend beyond the transverse Ligament of the Carpus. Its origin, in general, is not far from the place where the Radial Artery is reflected *anconad*.

the place of the rest being supplied by a branch or branches from the Radial Artery, as it is passing from the *Anconal* to the *Thenal* aspect.

In a fourth class, the Ulnar Artery, without any Thenal branch from the Radial, sends off a part of the Volar branches, while a branch, or branches, from the Radial Artery, as it is passing from the *Anconal* to the *Thenal* aspect, supplies the deficiency.

In a fifth class, the Great Interosseal, descending under the Ligament of the Carpus, is observed to give off Volar branches that, in other cases, are occasionally supplied by those branches of the Radial Artery, which it gives off, as it is passing from the *Anconal* to the *Thenal* aspect.

In a sixth class, the Radial, Ulnar, and Interosseal Arteries, inosculate freely beneath the Aponeurosis Palmaris, and, after uniting, send off the different Volar branches.

In a seventh class, of which I have only seen one specimen, that belongs to Dr. Monro, jun. and of which the Doctor very obligingly sent me notice, inviting me to see it, the Ulnar terminates in small branches beneath the Aponeurosis Palmaris, while the Volar Arteries are furnished by the Radial,

and chiefly by the part that is seen constituting the deep Volar arch (*r*).

In the third and fourth classes, where the Radial Artery supplies the deficiency of Volar branches from the Ulnar Artery, it generally does it in one or other of the following ways: By sending off from its Thenal branch the *Digito-Radial* of the Thumb; or by sending off, as it passes from the Anconal to the Thenal aspect, the *Digito-Ulnar* of the Thumb, or a branch that afterwards divides into the *Digito-Ulnar* of the Thumb, and the *Digito-Radial* of the fore-finger (*s*), or sometimes into the two *Digitalis* of the Thumb, and the *Digito-Radial* of the fore finger (*s*); or by sending off, in addition to the last, a branch which, running obliquely across the Metacarpal bone of the Index, divides afterwards into the *Digito-Ulnar* of the fore-finger, and the

(*r*) Something analagous had been seen by Haller, who, treating of the branches which he denominates the *Interossea Volares*, meaning the branches that run *distad* from the deep Volar arch, says, “*Aliquando adeo magnæ sunt, ut Digitales primario solæve generent, plerumque tamen minores quam in “Pede.”—Fuscic. vi. p. 46.*

(*s*) This is the branch so liable to be injured by a wound, between the finger and the Thumb, and which, from its size, or the copiousness of the Hemorrhagy, may often, by those whose knowledge of Anatomy is not very accurate, be taken for the Radial Artery itself.

Digito-Radial of the middle finger ; or sometimes into the two Digitals of the fore-finger, and the *Digito-Radial* of the middle-finger ; or, lastly, after forming its arch, and anastomosing with the Ulnar Artery, by sending off, in farther addition to these branches, the *Digito-Ulnar* of the little finger, and a Volar branch that afterwards divides into the *Digito-Radial* of the little finger, and the *Digito-Ulnar* of the ring finger (*t*).

As for the branch that is usually considered as terminating the Trunk of the Radial Artery, and which running *ulnad* across the Metacarpus, forms what is called the *Deep Volar Arch*, it is of different relative magnitudes in different individuals, in proportion to the number of Digital branches that are previously sent off. As it generally inosculates directly or indirectly with a branch or branches from the Ulnar Artery, it is found to be larger where the Ulnar branch meets it directly, and contributes to the formation of the arch, than where the communicating branch from the Ulnar inosculates only with some of its branches, or inosculates with other branches of the Radial, before the arch has begun

(*t*) This last distribution I have not seen, but I give it authenticated by the indubitable authority of Haller.—See *Fascic. vi. p. 43.* and *Fascic. vi. Tab. ii, fig. 7.*

to be formed (*u*). According to Haller, Verheyen was the first who described this branch, and the first who favoured the Public with a figure of it. Since that period, all Anatomists who have written on the Arteries, have, so far as I know, regularly mentioned it, though many with such uniformity in description, that one would be almost tempted to believe, that they had described it with little variation from the same individual, or the same figure. The illustrious Haller, who was well acquainted with several varieties which it not unfrequently exhibits in the species, has, after mentioning a number of those that were seen by others, given a detail of all the varieties which it happened to present in no fewer than six subjects, adding besides, elegant.

(*u*) The Radial Artery is often seen inosculating with the Ulnar Artery, by its Thenar branch that joins the superficial Volar arch; is often seen inosculating with the Ulnar Artery, through the Digital branches that run to the Thumb, and the fore-finger, or through the medium of that stem from which these branches derive their origin; it is also seen inosculating frequently with the Ulnar Artery, near to the Ulnar aspect of the Vola, either directly through the medium of its arch, or through the branches proceeding from its arch. The Ulnar Artery, in these cases, also inosculates through the medium of branches. These inosculations are independent of those numerous small inosculations, which are less obvious to the naked eye, and which generally admit of a much wider range of variety than those which are more conspicuous and large.

figures representing the differences of Arterial vessels, as occurring in the *Vola* of four individuals. Three of these figures to be found in his sixth, and the fourth to be found in his eighth Fasciculus.

Without entering into any description, unnecessarily minute, I shall only remark, that we cannot always observe the appearance of a regular and distinct deep Volar arch, more than of a regular and distinct arch immediately under the Aponeurosis. In those cases, where the deep one appears, comparatively speaking, to be well formed, it is sometimes formed by the Radial Artery, without a communicating Ulnar branch; the communicating Ulnar, in that case, inosculating only with some of its branches. At other times, the Radial Artery extends only a part of the way across the Metacarpus, when it meets the communicating branch from the Ulnar, and when both appear to assist equally in constituting the arch. This seems to be the form under which it was principally observed by Verheyen. At other times, the communicating branch from the Ulnar is so large, that it forms the greatest part of the arch, and is seen inosculating with the Radial Portion, near the Metacarpal bone of the Index. In this case, the diameter of the Trunk forming the arch, is generally largest near to the Ulnar aspect of the *Vola*.

But in what way soever this Volar arch happens to be formed, it regularly sends, from its convex aspect, towards the fingers, a number of branches (*v*), that, after spreading upon the Volar aspect of the muscles called *Interossei* and *Lumbricales*, form communications with the *Digital* branches, where the *Digitals* arise, or where they are continued from the Volar branches; branches (*w*) also that communicate (*x*) with those that run along the *Anconal* aspect of the *Interossei*, and which *Anconals* also inosculate with the *Digital* branches, at the *Distal* extremity of the *Metacarpus*. From its concave aspect, it sends branches (*y*) that, running *proximad*, inosculate with *Interosseal* branches upon the *Thenal* aspect of the *Carpus*; and some other branches (*z*), that perforating the *Interosseous* mus-

(*v*) *Arteriæ Interossee Volares* of Haller.

(*w*) The *Ramuli* forming these communications, are the *Perforantes Volares Inferiores* of Haller.

(*x*) The *Interossee Dorsales* of Haller.

(*y*) The *Retrogradæ* of Haller.

(*z*) The *Perforantes Volares Superiores* of Haller, of which he reckons three, equal in number to that of the interstices between the four *Ossa Metacarpi* belonging to the fingers. “*Perforantem Superiorem Unicam notam fuisse Winslowo adparet, inter minimi Digiti Os Metacarpi et proximum, n 154. Rameau, qui se glisse entre le troisième et quatrième Os du Metacarpi. Primum tres esse inveni et constitui Januario mense,*

cles, join the *Anconal* branches of the hand, at the *Proximal* extremity of the *Metacarpus*.

“a. 1745,” *Haller, Fascic. vi. p. 46* —Haller has described, with uncommon minuteness, these different branches of the deep Volar arch, although he has certainly rendered his description unnecessarily confused, in trying to distinguish its *Ramuli* by names, and in attempting to characterise them by these epithets, *Interosseal* and *Perforant*, the very epithets which he previously had bestowed on some other branches, not only in the immediate vicinity, but which even inosculate with some of the *Ramuli* from the deep arch. It is not unlikely, that, in such a description, he wished to show, that even Winkler could be surpassed. “ADOLPHUS BERNHARDUS WINKLER noster olim discipulus et in Theatro Gottingensi Proscetor, certe egregiam, et aetate imprimis, Arteriæ Brachii descriptionem dedit, quæ Perforantes superiores, Retrogradas, Arcum Volæ profundum, Ramos Volares Interossicos, Nutritias Ulnæ Radiique, circumflexas Humeri, et alia rectius proposuit, et nostris laboribus usus et suis.” But, “Ego,” says Haller, “Ego Minutos rerum fines fere ubique adjeci, et perforantes superiores, inferiores, Interosseas Dorsales, Interosseas Medias, — et alia quæ minus decet repetiisse.”—*Pref. ad Fascic. vi.* By tracing the *Minutos rerum fines*, he was led to perceive the obvious communications between the branches, upon the *Anconal* and the *Volar* aspects; and the observation that he makes respecting them is certainly just. It is only singular, that he should have confined to the hand, a remark, which, in general language, might have been extended to the whole system. It is now well known, that inosculation, similar in their object, though differing often in mode and degree, occur in every part of the structure; the circulation in every part being equally free, proportioned to the demands of the organs; and interruptions equally prevented by various textures of communicating branches.

RAMIFICATIONS ON THE ANCONAL ASPECT OF THE
CARPUS AND METACARPUS.

As the Ulnar Artery is the principal Trunk that generally appears on the Volar aspect, so the Radial Artery, though it frequently sends off a number of the larger Volar branches, is always the largest Arterial Trunk that appears on the Anconal. It invariably runs *ulnad* on this aspect, as far as the Metacarpal bone of the fore-finger, and often sends onward a considerable branch that turns and runs *distad*, between the Metacarpal bone of the fore and the middle finger. From the Trunk, in this course, are sent branches to the Anconal aspect of the Thumb, and to the Anconal aspect of the interstice,

As to the difference of relative magnitude in these branches, that often is a matter of less importance than their difference in number, and the difference of the mode in which they communicate. It must be evident, that in what way soever a Vascular Plexus happens to be formed, its communicating branches will fall to be necessarily larger or less, proportioned to the quantity of blood required, and proportioned to the frequency of partial obstructions in the larger vessels, from which the branches derive their origin. The observation which should have been extended, is in these words: “*Exigui errores non turbant hunc primarium et pulcherrimum Ordinem, quo ubique Sanguis, a dorso Manus ad Volam, a Vola ad dorsum Communicat, et omnis interceptio in Comminatu Sanguinis cavetur.*”—*Fascic. vi. p. 46.*

between the Metacarpal bone of the Thumb and the fore-finger, while from the branch there is sent a supply to the Anconal aspect of the interstice between the Metacarpal bone of the fore and the middle finger. Besides these Anconal branches, however, the Radial Artery sends off more, and often a branch that runs *ulnad* across the Carpus, and which, meeting with a branch of the Ulnar Artery, forms an *Ancono-carpal Arch*. This arch inosculates with several branches of Anconal Interosseals that descend to the Carpus; it inosculates sometimes with the perforating branches of the deep Volar arch that run *proximad*; it sends off, from its Distal aspect, branches that run along the Interossei, occupying the three intermediate spaces between the Ossa Metacarpi of the fingers. These last branches, in their progress *distad*, inosculate laterally with one another; inosculate, at the Proximal extremity of the Metacarpus, with the Volar perforants that run *proximad*; and, at the farther extremity of the Metacarpus, with the Digital branches, and the Volar perforants that run *distad*. If there be no Anconal arch, there is still, however, a Plexus of vessels formed by branches from the Radial, Ulnar, and Interosseal Arteries; branches, connected with this Plexus, that run along the Anconal

aspect of the Interossei, and that, at the commencement of the Metacarpus, inosculate with the perforants that run *proximal*, and, at its termination, with the Digital Arteries, and the perforating branches that run *distal*:

RAMIFICATIONS ON THE FINGERS AND THUMB.

EACH finger has two Digital Arteries on its *Thel* aspect, a *Digito-Radial* on the Radial side, and a *Digito-Ulnar* on the Ulnar side of its Flexor Tendons. Their origin, as has been already observed, is different often in different individuals, but their course and termination is generally steady. As they advance to the Distal Phalanx, they are seen inosculating by transverse branches on the Volar aspect, and by smaller branches reflected round upon the Anconal. Having reached as far as the Distal Phalanx, and passed beyond the insertion of the Tendon, they are observed gradually converging until they inosculate, and form an arch. This arch is named the *Digito-Volar*, and sends off, from its convex aspect, a great number of small branches towards the Cutis, where the sense of Touch is the most exquisite. Near to the place where the Trunks

converge, two of their branches, running *anconad*, also inosculate, and form an arch on the opposite aspect. This is the *Digito-Anconal arch*, which sends off, from its convex aspect, a number of branches which form a Plexus under the nail.

The mode of ramification on the Thumb, is similar to that which is found on the fingers, though, in general, the Anconal branches be larger, and the *Digito-Radial* less uniform than that belonging to any of the fingers. This *Digito-Radial*, arising sometimes from a Volar branch of the Ulnar Artery ; sometimes from the Thenal branch of the Radial ; sometimes from that branch of the Radial which furnishes, also, the *Digito-Ulnar* ; sometimes, though rarely, from the Interosseal ; and sometimes wanting, when it usually happens that the duty is performed by ramifications from the *Digito-Ulnar*, or the neighbouring Thenal and Anconal branches which spring from the Radial.

BRANCHES
FROM THE
STRAIGHT THORACIC PORTION
OF THE
AORTA.

THE Trunk of the Aorta, having sent the requisite supply of blood to the HEART and HEAD, to the NECK, and the two ATLANTAL EXTREMITIES, to the STERNUM, CARTILAGES, and the Intercostal muscles attached to them, to a part of the Pericardium and Diaphragm, to a part of the Abdominal muscles, and to some of the first Intercostal spaces, begins to lay aside the form of a curve, to approach the sides of the Dorsal Vertebrae, and then to proceed in a straight line towards the Diaphragm. In this course, it bends *sacrad* on the left of the Œsophagus, runs *dorsad* of the left division of the Trachea, and, when it has reached the Dorsal Vertebrae, lies on the left of the Mesial Plane, with a gradual in-

clination towards the right. The additional branches which it now sends off, are those which supply all the remaining parts of the Thorax, and which generally originate, either directly or indirectly, in the space interposed between the left Subclavian Artery, and that passage where the Aorta entering the Abdomen, exchanges the title *Thoracic Aorta* for that of *Abdominal* or *Ventral Aorta*. These branches are the BRONCHIAL Arteries, the ŒSOPHAGEALS, and what have been termed the AORTIC INTERCOSTALS.

ARTERIE BRONCHIALES.

THESE Arteries derive their name from accompanying the Bronchi, or the ramifications of the Trachea, through the substance of the Lungs. They admit of no definite description as to their size, number, or origin; they are generally small, and from two to five in number; the number being always uneven when a common trunk is distributed to the right and the left side. When they spring directly from the Aorta, those which cross the Mesial Plane to be ramified on the Dextral Bronchi* and Glands, are necessarily longer than those which are ramified towards the left. I have

never seen the case mentioned by Portal (c), where they all spring from a common trunk. If Lieutaud, and some others, following the ancients, have happened to restrict the epithet *Bronchial* to one Artery, which they call by way of eminence the *Bronchial*, it has never been in consequence of minute and accurate investigation. They had seen it, and supposed that no other Bronchial Artery existed, or that no other Artery, proceeding from the Aorta to the Lungs, was of note sufficient to be

(c) “ Les Artères Bronchiques sortent ordinairement de la face Antérieure de l’Aorte, au dessous de la Bronche gauche, toutes ensemble ou séparément.” The following passage from Haller might, at first sight, seem to favour the opinion, that all the Bronchials originate occasionally by a common Trunk. “ Valde frequens est, utrumque Pulmonem habere ab eodem Trunco Arterioso ramos suos, quod Veteribus contigisse videtur, nam ex Aorta provenientes et unam, scire communi consensu describunt.”—*Fascic. iii. p. 35* It is evident, however, from the preceding sentence, that Haller here is not describing a Trunk common to all the Bronchials, but merely the Bronchialis Communis; the Bronchial that rises without a fellow, and is afterwards distributed on the right and left Bronchi. The sentence immediately preceding is, “ Ut ordine historiam istam tradamus, tenendum est, Arterias Bronchiales esse dexteras, sinistras, communes, et vel omnes in uno subjecto vel aliquas adessc. A communi initium faciam. Bis communes duas vidi, quarum utraque in uno corpore ex Aorta, in altero, una ex Aorta, altera ex Intercostali venit. Hi casus fuerunt inter viginti quinque corpora.”—*Ibid. p. 36.*

dignified with the title. Their Bronchial Artery seems to be the Trunk that rises single from the Aorta, or a neighbouring Intercostal, and afterwards divides into two branches, a right and a left; in short, the *Bronchialis Communis* of Haller, or the *Bronchiale Antérieure* of Winslow.

The most Atlantal of the Bronchial branches being also ramified on the Pericardium, the coats of the Aorta, Pulmonic Artery, and Incumbent Glands, Haller is doubtful whether he should call them Bronchial Arteries, or the Superior and Posterior Pericardiac (*d*); when they rise in pairs, the right and the left have not unfrequently a different kind of origin. Haller has seen the right branch deriving its origin from the Sternal or Internal Mammary, from the common Trunk of the Subclavian and Carotid, from the Subclavian, from the first Intercostal, from the Sacrothyroid, from the Arch of the Aorta on its concave side, opposite to the large branches from the convex, and though generally to the left of the large branches, yet, in rare cases, sometimes before them towards the right. He has seen the left rising immediately from the Subclavian; sometimes before, and sometimes after the

(*d*) Fascic. iii. p. 34. N. 6.

Vertebral Artery; sometimes after the Sternal Artery; sometimes from the Sternal Artery itself; sometimes from the Trunk of the Aorta, at the junction of the Ductus Arteriosus; sometimes from the first Aortic Intercostal; sometimes from the first and second; sometimes ramified upon the Vertebrae; sometimes inosculating with the Intercostals; and sometimes sending off a Thymic branch, and the branch that accompanies the Phrenic nerve.

The other Bronchials, when they rise not directly from the Aorta, but from neighbouring Arteries, as the Intercostals, or by common Trunks with Œsophageals (*e*), have more frequently this secondary origin on the right side than upon the left, a circumstance that is very easily explained from the situation of the Aorta lying *sinistrad* of the Mesial Plane.

It is proved by injections, and is generally known, that the Bronchial Arteries inosculate with

(*e*) When the Bronchials chance to have a common origin with the Intercostals, or Œsophageals, the larger division is considered as the Trunk, and the smaller as the branch. Hence some Anatomists speak of Œsophageals arising from Bronchials, and others, as Winslow, of Bronchials arising from Œsophageals.

branches from the Pulmonic ; and these inosculationes are thought singular, as the blood which passes from the Bronchial vessels into the Pulmonic, must return by the Systemic Veins, Auricle, and Ventricle into the Aorta, without taking a circuitous course through the Pulmonic Auricle and Ventricle, the Pulmonic Veins, or Pulmonic Artery. The course, however, is not so short as that which is assigned to a part of the blood in the Cardiac Arteries, which is made to return into the Aorta without entering the Systemic Veins, or Systemic Auricle (*f*).

(*f*) See page 7. See also Adami Christiani Thebesii, *Dissertatio Medica de Circulo Sanguinis in Corde*. This dissertation, of which a second edition was published at Leyden in 1740, consists of thirty octavo pages. In it he informs us, that he regularly succeeded in inflating the Ventricle from the Coronary Veins. “ Ut nec unquam frustra cor aperuerim ;” and also succeeded with different injections, adding, “ Liquores “ Colorati, Gluten solutum, ipsaque cera, apta manu, ramis “ venarum majoribus immissa, venarum aperturas et in utra- “ que Auricula et in ambobus cordis thalamis clare demon- “ strant.” He acknowledges that something similar had been observed by Frederick Ruysch, in his answer to Letter X ; and strongly suspects that these are the vessels which had been mistaken by Vieussenius, for branches of the Cardiac or Coronary Arteries. “ Dum hæc conscribo, affertur Epistola Cl. “ Vieussens ad Cel. Boudinum scripta, quæ titulum fert : “ *Nouvelles decouvertes sur le coeur ;* in qua Anatomicus excel-

The Bronchial Arteries are mentioned in a vague and general manner by Erasistratus and Galen.

“ They are mentioned also,” says Haller, “ by Rhazes and Avicenna, and by other Anatomists,

“ *lentissimus multa protulit experimenta, quibus sententiam Cartesii confirmare laborat : Secerni nempe aliquod fermentum per Arterias Coronarias in sinus cordis, a quo ejus diastole sit derivanda. Huic simile quid asserit Broen Opera. Med. Theor. § 51. aliique. Sed videntur venulæ illæ modo descriptæ tam multis egregiis viris imposuisse, ut Arteriæ Coronariæ propagines, illas crediderint et inde liqui- dum illud fermentans secerni asseruerint.*” Mr. Abernethy of Bartholomew’s Hospital, made a coarse injection, whether into the Veins or Arteries, pass through these Venulæ Thebesii, which he denominates the Foramina Thebesii. In the healthy state, they are often so small as not to admit the coarse injection ; but greatly enlarged after pulmonary consumption, where there had been a degree of obstruction to the circulation of blood in the Lungs. According to him, their enlargement is calculated to prevent the distention of the Cardiac vessels ; and he supposes the Foramen Ovale to be frequently re-opened for a similar purpose. Upon examining the hearts of those who died of consumption, I have generally perceived a slight communication between the two Auricles, near the upper or atlantal margin of the *Vestigium Foraminis Ovalis*. I have also seen this communication where there had been no previous consumption, and a like communication in different parts of the Vestigium. Nay, I once opened a female subject, of the age of twenty, where a great part of the Foramen Ovale was left open, where there was no livid appearance of the integuments, no discoloration of the muscles, and no preternatural laxity of fibre, so far as I was capable of judging. Mr. Abernethy’s idea is new, that such communications

“down to the time of Realdus Columbus, who,” he says, “was the first that denied their existence.” The fact with respect to Columbus, is this: It occurred to him, when treating of the Lungs (*g*), that

are rather effects than causes of consumption. But supposing them effects, they are certainly effects differing in species, the enlargement of the Foramina Thebesii being a case that is very different from the formation of a new passage through the Vestigium Foraminis Ovalis.—See *Philosophical Transact. Part I. for 1798.*

(*g*) “Pulmo gignitur ut recte Anatomici scribunt, ob cordis
 “refrigerationem: quod efficit, aerem ad illud frigidum defe-
 “rens. Factus præterea fuit Pulmo ad inspirationem, atque
 “expirationem, et ut voci deserviat. Atque hos omnes Pul-
 “monis usus noverunt, qui ante me scripsere, præter quos *Ego*
 “*alium addo maximi momenti, de quo ne per transennam quidem*
 “*meminere.* Est autem præparatio, et pene generatio vitalium
 “spirituum, qui postmodum in corde magis perficiuntur. Ae-
 “rem namque per nares et os inspiratum suscipit: nam asperae
 “Arteriæ vehiculo per universum Pulmonem fertur, Pulmo ve-
 “ro aerem illum una cum eo sanguine miscet, qui a dextro cor-
 “dis Ventriculo profectus per Arterialem venam deducitur.
 “Vena enim hæc Arterialis præterquam quod sanguinem pro
 “sui alimento deferat: Adeo ampla est, ut alius usus gratia de-
 “ferre possit. Sanguis hujusmodi ob assiduam Pulmonum
 “motum agitur, tenuis redditur, et una cum aere miscetur,
 “qui et ipse in hac collisione, refractioneque præparatur: ut si-
 “mul mixti sanguis et aer per Arteriæ Venalis ramos suscipi-
 “antur: tandemque per ipsius truncum ad sinistram cordis
 “Ventriculum deferantur: deferuntur vero tam bene mixti, at-
 “que attenuati, ut cordi exiguus præterea labor supersit: post
 “quam exiguam elaborationem, quasi extrema posita Manu

the blood, which had been generally supposed to have received its vitality in the Heart, and to have returned in Veins and Arteries from branches to Trunks for that very purpose, rather received this vitality in the Lungs ; and, that, therefore, the blood of the *Vena Arterialis*, or Pulmonic Artery, instead of returning to the right Ventricle, flowed through the *Arteria Venalis*, or Systemic Veins, and the left Ventricle to the Aorta.

As this idea of the vital blood being generated in the Lungs had never occurred, as he imagined, to any Anatomist before his time, he seems anxious to establish its truth against the sceptical Aristotelians (*h*), to whom, he was certain, it would appear paradoxical and absurd. One of the arguments, there-

“ vitalibus hisce spiritibus, reliquum est, ut illos ope Arteriæ
 “ Aortæ per omnes corporis partes distribuat. Non vereor quin
 “ novus hic Pulmonum usus quem nemo Anatomicorum hactenus
 “ somniavit, incredulis, atque Aristotelicis paradoxon videri
 “ debeat, quos oro rogoque, ut Pulmonis magnitudinem con-
 “ templentur quæ absque vitali sanguine permanere non pote-
 “ rat : Cum nulla sit tam minima corporis particula, quæ illo
 “ destituatur. Quod si vitalis hic sanguis in Pulmonibus non
 “ gignitur : a qua parte transmitti poterat ; præterquam ab
 “ Aortæ Arteria ? At ab Aorta Arteria ramus nullus, neque
 “ magnus neque parvulus ad Pulmones mittitur.”—*Lib. xi. cap.*
 “ 2. *De Re Anatomica.*

(*h*) Aristotle thought that the blood flowed backwards and forwards in the same channels, like the tides of the Euripus between Attica and Eubœa.

fore, which he brings in support of the hypothesis, for with him it was nothing but an hypothesis, is, that if vital blood, or the blood that pulsates, be not generated in the Lungs, where it mixes with the air, and is sent from the Arteries into the Veins to be perfected in the left, or Systemic Ventricle, it can be generated no where else, as the Aorta, in his opinion, has no communication whatever with the Lungs by Arterial vessels, either great or small.

This reasoning of Columbus, in which the lesser circulation of the blood is rather supposed than demonstrated, would have naturally prepossessed him against the idea of Bronchial Arteries, if he ever had heard that such Arteries existed. But he seems to have never heard of such vessels, and ventures his assertion without the suspicion of being contradicted, or of differing in opinion from any one of his predecessors. Laurentius, Spigelius, and several others, were as ignorant of these Arteries as he; so that Frederick Ruysch, who was less of a learned than practical Anatomist, when he first saw a Bronchial Artery, boldly asserted, that he was the first who had ever observed one (*i*). His rivals and enemies, to mortify his pride, and silence his boasting, lost no time in making him acquainted with

(i) “ Hanc Arteriam a nemine adhuc observatam esse, intrepide affirmo.”—*Observat. Anatomica* xv. vol. 1.

what had been said of Bronchial Arteries by Erasistratus, Galen, and Marchettis. His friend however, John Henry Graetz (*k*), was not less prompt, or less zealous, in making a reply: He cites the passages from Erasistratus and Galen at full length; shows that their meaning is obscure and enigmatical; that Marchettis talks only, in a general way, of two or three Arteries that spring from the Aorta to be ramified on the Lungs; and that his friend Ruysch was the first Anatomist who had accurately examined, traced, and described one. I regret that Haller should have overlooked these reasonings of Graetz; and that, in depriving Frederick Ruysch of the honour of discovery, he should also have withheld from him that credit to which he was certainly justly entitled, the credit of being the first writer who gave an authentic and accurate description of a Bronchial Artery (*l*).

(*k*) Epist. Anatomic. Problematica sexta, ad Fred. Ruyschium.

(*l*) Ruysch's description of the Bronchial Artery is as follows: "Hanc, Arteriam BRONCHIALEM nominare visum fuit; "supra Bronchia enim serpens ea concomitatur ad finem usque. "Ortum sumit ab Arteriæ magnæ descendents postica parte, "digiti latitudine, plus minus, supra Supremas Arteriarum Intercostalium, ex Aorta descendenti exortarum, aliquando "etiam duorum digitorum latitudine Supra Arterias modo dictas; nonnunquam etiam infra eas originem habere comperio:

From the time that Ruysch saw this Bronchial vessel, he supposed it was intended for nourishing the Lungs, the Bronchial Tubes, and the Bronchial Glands; the Pulmonic Artery, in his opinion now, being chiefly destined to transmit blood for the sake of undergoing a change by respiration (*m*). Advancing this opinion, he does not appear to have recollected that the blood, while flowing in the last

“ placet enim naturæ aliquando varietate frui. Nunc unica ex-
 “ surgit, nunc gemina, ita ut sæpius, Arteriâ Magnâ Cadavere
 “ exemptâ, Intercostalibus et Bronchialibus abscissis, trunculi
 “ Bronchialium remanentes, exortum Intercostaliuni mentian-
 tur.”—*Ruyschii Oper. Tom. 1. Observat. Anat. xv.*

(*m*) “ Hanc Arteriam Bronchialemaximi faciendam esse
 “ existimo, non quidem ratione quantitatis, sed qualitatis san-
 “ guinis. Sanguinem enim sinistrum Cordis Thalamum trans-
 “ gressum, nobiliorem esse, dextri Ventriculi sanguine, quis ne-
 “ gaturus? Existimo itaque, ut finem imponam, hanc Arte-
 “ riam esse conditam, ut Pulmonibus sanguinem nobiliorem,
 “ perfectiorem, imo magis exaltatum, communicaret.”—*Ruys-*
chii Opera, ibid. In 1659, about thirty years from the time
 that he first saw the Bronchial Artery, Ruysch mentions, in a
 letter to Graetz, that he had observed considerable variety with
 respect to its origin; that he had seen it not only arising from
 the Aorta, but Superior Intercostal and the third Intercostal;
 and that he had filled its ramifications by injecting wax from
 the Pulmonic Artery, though he never had attempted to inject
 the Pulmonic Arteries from the Bronchial. “ Repletâ Arteriâ
 “ Pulmonali Ceraceâ Materiâ, illico quoque repleti conspiciun-
 “ tur ramuli Arteriæ Bronchialis; nullusque dubito, quin hoc
 “ vice versa quoque fiat, quamvis id nunquam tentarim.”—
Ruyschii Opera, vol. 2. Epistola Problematica sexta. p. 20.

branches of the Pulmonic Artery, and before it enters the Systemic Veins, must be blood of the same, or very nearly of the same quality as that which flows in the Aorta, and is afterwards distributed through the medium of its branches to the system at large.

In animals with but one Auricle and Ventricle, branches proceeding from the Aorta are the only Arteries that are ramified upon the organs of breathing; so that vessels, analogous to the Bronchial Arteries, are more general in the Animal kingdom, than even a Pulmonic Artery itself.

ARTERIE ŒSOPHAGEÆ.

STRICTLY speaking, Œsophageal Arteries ought to include all those Arterial branches that are ramified on the Portion of the Alimentary canal, termed Œsophagus, and which extends from the Pharynx to the Stomach. In the region of the Neck, this Portion receives branches from the Sacrothyroid, from other branches of the Subclavian, and from the Subclavian Artery itself, though generally branches without a name. The Arteries here called Œsophageal, are those which, originating in the cavity of the Thorax, are afterwards wholly, or principally, ramified on that Portion of the Œso-

phagus which extends from the first rib to the Cardia. Like the Bronchial Arteries, they are indefinite as to their size, number, and origin ; but larger in size when they are few, and more in number when they are small ; the number is usually from two to five. They rise from the Aorta, or by common trunks with the Bronchial Arteries, or the Intercostals, and often extend their ramifications to the parts adjacent ; if near the Pericardium, to the Pericardium ; if near the Lungs, to the Lungs ; if near the Vertebrae or Pleurae, to the Vertebrae and Pleurae ; if near the Diaphragm, to the Diaphragm ; while the last accompanying the Œsophagus to the Stomach, is seen spreading upon the Cardia, and there inosculating with branches from the Gastric, which ultimately derives its origin from the Coeliac.

ARTERIÆ INTERCOSTALES AORTICÆ.

THESE Arteries are named Aortic, or Inferior Intercostals, to distinguish them from the first, or Superior Intercostal (*n*), that usually arises from the Subclavian, or some of its branches. They are ramified on the Vertebral column and Tube, on the

(*n*) See page 74.

Pleuræ, the Ribs, Intercostal muscles, the Great Sympathetic, and the parts adjacent. They rise in pairs from seven to ten in number, according as the first, or Superior, Intercostal supplies one or more of the Costal interstices; according as the number of the pairs of Ribs are more or fewer than twelve, which but rarely happens; or according as each Intercostal space (*o*), on which they are ramified, is supplied by a separate Intercostal Artery, and not two of them supplied, a circumstance which very seldom occurs, by a common trunk (*p*).

(*o*) A difference likewise arises in the number, from Anatomists annexing different ideas to the term *Intercostal*, as applied to Arteries. According to Haller, this term is applicable only to those Arteries which run in the Intercostal spaces; and therefore the last of his Intercostal Arteries, is that which follows the Sacral margin of the eleventh rib. “*Intercostalis Aortica nona et infima est, quæ sub undecima costa decurrit.*”—*Fascic. viii. p. 69.* According to Boyer and others, the last Intercostal Artery is that which follows the Sacral margin of the twelfth or last rib. “*La dernière Intercostale suit le bord Inférieure de la dernière Côte.*” This Artery of Boyer might properly enough be termed a *Costal Artery*; but has certainly no title to the epithet *Intercostal*. It is the first Lumbar Artery of Haller.

(*p*) “*Neque hoc rarum est deesse truncum aliquem Intercostalem, ut duo intervalla ramos Intercostales ab una ex Aorta radice habeant, unde quidem nihil in reliqua historia mutatur.* Ejusmodi exempla etiam habet J. B. WINSLOW, iii. p. 118. Paulo aliam varietatem JOSEPHUS LIEUTAUD proposuit. *Essais d'Anat.* p. 487. Arteriam nempe Inter-

They rise from the Dorso-lateral aspects of the Aorta; those which are ramified towards the right passing across the Mesial Plane, and running *dorsad* of the Vena Azygos. From the place of their origin, they run in a direction *laterad* and *atlantad* (q), till

“costalem tam dextram, quam sinistram uno trunco ex Aorta natam.”—Haller, *Fascic. viii. p. 65*. The passage of Lieutaud, to which Haller refers, is in the Paris edition of 1766, at page 416. “Il arrive ordinairement que les premières des Intercostales viennent de l’Aorte par un seul tronc, nous avons dit qu’elle produisoit quelquefois de cette manière les Intercostales Supérieures qui naissent communement des sous-clavières. On observe assez souvent, que les Intercostales des deux Côtés naissent d’un seul Tronc, qui vient de la partie postérieure de l’Aorte.” Can it be possible that this is the passage to which Sabatier alludes, when he says? “M. Lieutaud rapporte une variété plus extraordinaire: Il a vu toutes les Intercostales Inférieures venir de deux troncs qui tiroient leur origine de l’Aorte; il y en avoit un à droite et un second à gauche.” Or is it not equally singular that Portal should consider this variety, which is mentioned by Lieutaud, as the common mode in which the Aortic Intercostals originate? “Ces Artères (les Intercostales Inférieures) sortent de la partie latérale et Postérieure de l’Aorte, *par paires* réunies en un seul tronc tres court.”

(q) Portal had seen Intercostals running obliquely *laterad* and *atlantad* over two or three ribs, to the Costal interstices on which they were ramified. If he meant to say that he has seen them running on the vertebræ, and passing two or three of the interstices, he has seen nothing new, but if he has seen them crossing the ribs, as they appear in Haller’s Fig. Fascic.

they reach the Sacral margins of the Ribs, a little beyond their articulations with the transverse Processes. Having reached these margins, they coast along them towards the Sternum, or Sternal aspect,

vii. Tab. v. where the Aorta is quite removed from its natural situation, he has seen something that is rather uncommon. His language is, “ Souvent même, elles passent sur un de ces interstices sans y fournir des rameaux, et remontent au-dessus de deux et trois Côtes; les premières, plus haut que les suivantes, qui ont une direction horizontale.” He has seen them also running *laterad* and *sacrad*, to reach the interstices on which they were ramified. “ D’autres Artères Intercostales Inférieures, ont quelquefois leur sortie de l’Aorte Supérieurement aux espaces intercostaux dans lesquels elles se placent.” The most atlantal of these Intercostales has its origin generally about the fifth Vertebra, or opposite to the Cartilage between the third and fourth, and all the Intercostals, not excepting the first, which usually arises from the *Subclavian*, and descends to its interstices, have most commonly a retrograde course with respect to the Trunk from which they originate. That course is less retrograde the farther they are removed from the heart. At the last rib, they rise nearly at right angles; while the Lumbar Arteries, that follow in succession, begin to run *laterad* and *sacrad*, and more and more *sacrad* in proportion to their distance from the left Ventricle. In short, these angles seem to be varied that the blood may flow nearly with the same force or momentum in all these Arteries; the angles, at which they severally originate, being less favourable to the momentum where the current is stronger in the Aorta, and more and more favourable as that current is weaker. An excellent representation of these several angles may be seen in the seventh Fasciculus of Haller, Tab. v.

where those in the interstices, situated *atlantad* of the sixth Rib, inosculate with branches from the *Thoracics*, and with Lateral branches from the *Sternal Artery*. Those in two or more of the interstices, situated *sacrad* of the sixth Rib, inosculating with branches from the *Musculo-Phrenic* and those in the interstices, still more *sacrad*, with branches from the *Phrenic Artery* itself, or with Lateral branches from the *Epigastric* and the *Abdominal* (r).

From the place where they reach the Sacral margins, to some way beyond the middle of the Ribs, they run on the concave side of the margins *peripherad* of the Pleura, and there assisted by the Vein and the Nerve, termed *Intercostal*, are observed to produce, in a number of the Ribs, a groove or depression. Beyond the termination of this groove, where the Ribs are less extended in breadth, they are no longer observed on the *central*, but upon the *sacral* aspect of the margins ; while several of them, particularly in the interstices of the true Ribs, send off a branch that runs obliquely *sacrad* and *sternad*, till it reach the Atlantal margin of the Rib that is situated *sacrad*, when it runs on the opposite side of the interstice, parallel to the Trunk that had

(r) See Haller, *Fascic. iii. p. 27*, and *Fascic. viii. p. 69*.

given its origin. This branch, which is sometimes called the *Inferior Intercostal*, is, like the Trunk, often seen continued into some of the branches from the Sternal aspect (s).

(s) Haller, speaking of the Aortic Intercostals in general, says, “ Omnes id commune habent, ut proxime Capitulum suæ
 “ Costæ in duos Ramos discedant, DORSALEM ad musculos dorsi
 “ se penetrantem, spinalemque medullam, et INTERCOSTA-
 “ LEM qui continuo iterum divisus duobus parallelis truncis Cos-
 “ tarum suarum oras tegit.”—*Fascic. viii. p. 65.* The words here printed in Italics, have been interpreted different ways: Murray has supposed that the two branches coasted along the opposite margins of the same rib, and has therefore described the Superior or Atlantal as the smaller division of the common Trunk. Others have supposed that the two branches run along the margins of neighbouring ribs, situated on the opposite sides of the interstice, and therefore describe the inferior branch as the smaller division of the common Trunk; the last is the meaning which the words of Haller were intended to convey. “ *Ramus*,” he says, “ *Ramus Intercostalis* tegitur, Pectus versus, musculus ejus nominis internis.—Ad exiguam a Costæ capitulo distantiam, paulo serius ocyusve dividitur in duos ramos.—Ramus inferior a quarta Intercostali deorsum minus constanter, et nonnunquam perexiguus est, et fere absque ramis, præter eos qui Costæ Membranas pulchre pererrant, et similibus ramis occurrunt, a superiori natis, tum eos qui musculis intercostalibus prospiciunt.—Sæpius Inferior Trunculus, alioquin minor, in superiorem, adscendit, et ipsi immittitur neque alium finem habet.”—*Fascic. viii. p. 66.*

Ruysch, who admits the inferior branch towards the sternal extremity of the Ribs, and between the Cartilages, thinks that such a branch at their Vertebral extremity is a rare occur-

Of the numerous branches that pass, *peripherad*, through the Costal interstices, to be ramified upon the incumbent muscles, there is only one which Haller has chosen to distinguish by a name. It is

rence. “Variis in locis dictas Arterias Mammarias non solum trunculis suis irrigare demonstrabam inferiorem Limbum Cartilaginum Costarum, verum etiam superiorem secus ac in spatiis interosseis, ubi rarissime si unquam, binis trunculis singularem costam infra supraque ditari, observavi: In aliis autem objectis demonstravi quoque dictos trunculos intercartilagineos per solum marginem superiorem in aliis locis, per inferiorem disseminari.”—*Epist. ii. p. 18.* What Ruysch has said here, must be understood of Intercostal Arteries running on the central aspect of the muscles; for Tab. iii. fig. 3. of his first Thesaurus, represents Arteries running along the opposite margins of the same Rib. His language respecting them is, “Arteriæ Intercostales, exteriores a me dictæ, non solum per Costarum limbum inferiorem, verum etiam inferiorem reptantes. Hæ autem originem ducunt, non immediate ex Arteriæ Magnæ Trunco, neque ex Mammariis Arteriis Internis, ast vero rami Intercostales interiores, dictas exteriores Producent.”

Portal, speaking of External Intercostals that follow the Atlantal margins of the Ribs, says, “These Arteries were known to Ruysch, and originate in Dorsal branches that pass *peripherad* near the angles of the Ribs.” From this description, they appear to be the same with Murray’s Superior Costal branches, and though they may commence from the Dorsal branches, near the angles of the Ribs, yet through the whole progress of their course they receive supplies from many other branches that run *peripherad* from the Primary Trunk.

called the *Dorsal*, from the situation where it penetrates to the Peripheral aspect. It rises near to the origin of its Trunk, and passes outward, between the *Vertebræ* and those *Ligaments* that extend from Transverse process to Transverse. It is ramified on the *Multifidus Spinæ*, the *Spinalis Dorsi*, the *Semispinalis*, the *Longissimus Dorsi*, and the *Sacrolumbalis*; as also upon the *Latissimus Dorsi*, the *Trapezius* and *Rhomboidus*, where these are adjacent.

Thus, on comparing the descriptions given of the *Intercostals* by different authors, we find that the same terms are employed to denote very different branches; the *Superior Intercostal* branch of *Haller*, is the continuation of the Trunk; the *Superior Intercostal* of *Murray*, one of the *External Intercostals* of *Ruysch*; the *Inferior Intercostal* of *Haller*, a small branch not observed by *Ruysch*, commencing near the angle of the *Ribs*, and following the *Atlantal* margin of the *Rib* that is situated *sacrad*; the *Inferior Intercostal* of *Murray*, the continuation of the Trunk; the *Inferior Intercostal* of *Boyer* and others, the branch which occasionally separates from the Trunk, near the *Sternal* aspect, and, like the inferior at the *Vertebral* extremity, runs on the opposite side of the interstice as pictured by *Ruysch*. This singular confusion of language has partly arisen from the hurry of compilers not having patience to investigate the structure, nor to understand the meaning of the authors from whom they were copying; and partly too from thinking themselves always bound to describe whatever had been described by others, whether acquainted with the subject or not.

From this Dorsal branch, or directly from the Trunk of the Intercostal, a branch is sent to the neighbouring Vertebrae, and a branch to the Involucrum of the Vertebral Tube (*t*). This last, on entering the Tube, divides into two subordinate branches; one running round by the Dorsal aspect, and another by the Sternal, to meet their fellows of the opposite side; they also inosculate *atlantad* and *sacrad* with the neighbouring branches of the same side.

From this *Vertebro-Involucral* branch, from the Dorsal branch, or from the Intercostal Artery itself, other two branches are sent through the Intervertebral spaces, one to be ramified on the Dura Mater (*u*), the other to be ramified on the Spinal Marrow (*v*), and to communicate with the Spinal canals. But these are small, compared to the branch which is seen ramified upon the Involucrum, and are not found so regularly present as to enter at each Inter-vertebral space (*w*).

As the Intercostals proceed in their course towards the Sternal extremity of the Ribs, they send

(*t*) Vertebro-Involucral branch. See p. 73.

(*u*) Vertebro-Meningeal branch. See p. 73.

(*v*) The Medullar branch, *ibid*.

(*w*) See p. 72 and 73.

off branches *allantad* and *sacrad* to supply the bones, muscles, and Periosteum in their vicinity ; branches to communicate with the neighbouring Intercostals ; and many branches, which, passing *peripherad* like the Dorsal branch, and inosculating laterally near the margins of the Ribs, constitute the vessels which Ruysch has named the External Intercostals, and which, on certain occasions, may be seen in very minutely injected preparations.

BRANCHES

FROM THE

ABDOMINAL PORTION

OF

THE AORTA.

THE Aorta, having sent branches to the HEAD, NECK, ATLANTAL EXTREMITIES, the VISCERA of the THORAX, and its Parietes, now enters the Abdomen between the Long Crura of the Diaphragm (c)

(c) The passage in the Diaphragm, by which the Aorta enters the Abdomen, is so admirably constructed, that the actions of the Diaphragm cannot affect it, so as either to accelerate or retard the circulation.

dorsad, sacrad, and a little sinistrad of that passage where the Œsophagus terminates in the Cardia. From the place where it enters, resting on the last of the Dorsal Vertebrae, to where it divides, at the fourth of the Lumbar, into two branches, that supply the Pelvis and Sacral Extremities, it is known by the name of *Abdominal Aorta*.

From this portion, branches are sent to the Abdominal Viscera and Parietes: These branches, in the order of description, are the PHRENIC ARTERIES, the CÆLIAC, the SUPERIOR MESENTERIC, the INFERIOR, the EMULGENT OR RENAL, the

(d) “ In quarta Lumborum Vertebra finditur, vel superius
 “ in corpore vel inferius in Cartilagine, quæ inter eam quartam
 “ Vertebra et quintam latissima adest. Vena cava demum
 “ in quinta Vertebra dividitur. Ita vere, ut solet Eustachius,
 “ T. 26. et pro varietate refert J. B. Winslow, *Tr. des Arteres*,
 “ n. 228. Paulo altiore in observationibus divisionem facit
 “ Fallopius, p. 136. qui Aortam Arteriam in Cartilagine inter
 “ tertiam et quartam lumborum, Venam Cavam in quartæ Ver-
 “ tebræ corpore dividi scribit. Raræ sunt fabricæ in quibus
 “ Arteria Aorta altius dividitur. Talem, vir egregius D.
 “ PESTSCHE in *fascic observ.* describit, in qua Aorta sub renali
 “ Arteria fissa fuit, ut duo rami iterum inter se communicarent,
 “ eaque ex dextro truneo Iliacæ sui lateris, ex sinistro præter
 “ Iliacæ, Mesentericæ inferiorem dedit.”—*Haller, Fascic.*
iv. p. 27. I have never seen any division of the Aorta similar
 to that which is mentioned by Pestsehe; but have seen the com-
 mon Iliac Veins, in returning the blood from the Sacral extre-
 mities, unite on the fifth Lumbar Vertebra by a transverse

SPERMATIC, the CAPSULAR, the ADIPOSE, the URETERIC, and the LUMBAR. Of these, the Cœliac and the two Mesenteric are always single ; the Phrenic, the Renal, and the Spermatic, generally in single pairs ; the Lumbar in five or in six pairs ; the Capsular, Adipose, and Ureteric, also in pairs ; but the number indefinite, and the origins various.

ARTERIÆ PHRENICÆ.

THESE are the Arteries that, rising directly, or indirectly, from the Abdominal part of the Aorta, are ramified on the concave side of the Diaphragm, and which, advancing from the Mesial Plane at its Dorsal aspect, extend their branches *sternad* and *laterad*, till they meet with branches from the Sternal Arteries and the Intercostals.

When two of them arise by a common trunk, that trunk is either from the Cœliac, or from the Aorta ; when they rise separately, both are from the Cœliac (*e*), or from the Aorta ; or one from the Cœliac, and

branch ; but ceased to unite in a common trunk, until they had reached as high as the kidneys, where the left received the venous blood from the left kidney, and the common trunk the blood from the right.

(*e*) Haller observed that the Phrenic branches arose more frequently from the Cœliac Artery than from the Aorta “ Phre-

one from the Aorta ; or one from the Renal, and one from the Aorta ; or one from the first Lumbar Artery (*f*), and the other from either the Cœliac or Aorta ; or one from the Trunk of the Cœliac Artery, and another from a branch of the same Artery. In one instance, Haller saw three, two from the Trunk, and one from a branch of the Cœliac ; and in another four, two from the Aorta, and two from the Cœliac. But, were we to mark every difference in number, in mode of origin, in relative distances, in magnitude, situation, in arrangement and extent of ramification, and in the varieties of inosculation, instead of a page, we might fill a volume, not only with the varieties of the Phrenics, but of many other Arteries. Our object in examining such varieties, should be to ascertain what is regular, and what is variable in the character of an Artery, after obtaining the general result upon the fair principles of induction, to disregard, in our description, every future variety that does not affect the general conclusion previously established.

“ nicæ.—Una vel utraque plerumque ex Cœliaca venit, et frequenter quam ex Aorta, per meas certe observationes.”
—*Fascic. ii. Annotat. ad Tab. 1. not. 6.*

(*f*) “ La Cœliaque, la première Lombaire droite produisent très-souvent la Diaphragmatique de ce Côté.”—*Lieutaud, Essais Anatomiques.*

After the many varieties he had seen, and of which he had read respecting the Phrenics, at the time when he published his second Fasciculus in 1745, Haller had continued to observe, and record additional varieties till 1756, when he published his eighth, and last Fasciculus (*g*). And, had he persevered in the same inquiry, might have discovered a great many more, without leading to any important or general inference, that could not have been deduced from his previous observations.

These Arteries are not only irregular in their number and origin, but in their extent of ramification. They are not always confined to the Diaphragm; they have been observed distributing Ramuli to the Capsulæ Atrabiliaris, to the Liver and Pancreas. As for their inosculation with the Intercostals, the Œsophageals, and Phrenic branches descending from the Thorax, they are only singular when they happen to be more conspicuous than usual: It being common in every situation for Arteries to inosculate, through the medium of their branches, with those in their vicinity, with those that are ramified on the same organ, or with those that are ramified on contiguous organs.

(*g*) See *Fascic. ii, iii. and viii.*

ARTERIA CŒLIACA.

A VERY minute and detailed account of this Artery, containing his own, and many observations of preceding Anatomists, was published by Augustus Fred. Walther in 1729. In this account, accompanied with a figure, which, though not very elegant, is sufficiently accurate as to the Anatomy, he frequently mentions the absolute distances in lines and inches, not recollecting, that, if these distances were in regular proportion, they must vary with the size of the individual, and, if not in proportion, must necessarily differ in different individuals of the same size, particularly in an Artery, which he has shown to enjoy such latitudes in the order, number, the magnitudes, and ramifications of its branches.

To the varieties mentioned by Walther, the illustrious Haller, from his own observations and extensive reading, has made numerous additions, both in his second and eight Fasciculus, and besides in his second has given two elegant engravings, representing the branches of the Cœliac Artery, as they occurred in two individuals. To these branches he has given names, and most of these in allusion to

the parts on which they are ramified, as the Stomach, the Liver, the Spleen, the Pancreas, the Pylorus, Duodenum, and the Epiploon. But, as each of these parts is supplied by branches that, in different individuals, exhibit diversities in origin, number, and ramification, their names, like those denoting a species in Natural History, should be general terms, and never be employed to express any individual distinctions.

Any naturalist would be deemed inexcusable, if pretending to describe the species dog, lion, or horse, he merely described a particular animal belonging to these species. This, however, is but too frequently the practice with Anatomists, who, in describing a nerve or a blood vessel, usually describe some common variety as forming its general outline or character, and then enumerate the other varieties, which they happen to observe, as particular exceptions; though these varieties be no more exceptions from the one described, than the one described is to be held an exception from them.

Many Anatomists, perceiving that the previous descriptions of authors were not applicable to those varieties of the Cœliac Artery which they had observed, have invented names to suit the varieties which they had seen; so that names, for the vary-

ing branches of the Cœliac, have been multiplied to the utmost degree of confusion. Nor has Haller in the least diminished this confusion; by collecting these names, and attempting to show that they all are synonymes of one or other of the varieties which he has described, he seldom divests himself of the notion that he is describing regular Arteries, or refrains from the habit of enumerating particulars, instead of generalizing his ideas. Although he knew, he does not seem to reason as if he knew, that, in addition to the general latitude of ramification enjoyed by the Cœliac, in common with other Arterial Trunks, it has a peculiar claim to more, a claim arising from the varying proportions of the principal organs on which it is distributed. In young subjects, such as those from which he has taken his two figures, the proportional magnitude of the Liver is greater than in the adult, and the size of the Arteries varying with the size of the organs on which they are ramified (*h*), the Gastric

(*h*) See above, p. 11. and Introduction, p. xxiv. and xxv. In the case mentioned by Mr. Abernethy of Bartholomew's Hospital, where the Vena Portæ terminated in the Vena Cava, and where the Hepatic Artery was the only vessel that supplied the Liver with blood, for the purpose either of nutrition or secretion, it was found to be larger than common. See *Vol. 1. Philosophical Transact. for 1793.*

branches in these figures seem only branches from the Hepatics; while the Splenic, which is larger in the adult than all the Hepatics taken together, is here but a branch of one of the Hepatics to the right lobe.

Such varying proportions, from age or disease, are no small source of different appearances in the ramifications of the Cœliac Artery, and no unusual source of confusion in the description. Thus, when a branch is distributed to both the Stomach and Liver, if the one to the Liver happen to be the larger, the Hepatic branch is then said to send off the Gastric, or if the Gastric happen to be the larger, it receives a name, implying that it sends off the Hepatic. On this principle, a Gastric branch is occasionally made to send off a Phrenic, while a Phrenic branch is made, in its turn, when it happens to be larger, to send off a Gastric.

If I give a description of the ramifications of the Cœliac Artery, at once more concise and more suitable to its general character than is given by Haller, I wish the reader to be informed, that he is less indebted to me than he is to him for the improvement. Had it not been for his unwearied research and extensive information, I should not have had, from my own observations, or the writings of any

other Anatomist, a sufficient number of authenticated facts to be able to distinguish what is general, from what is particular, in its ramifications and mode of distribution.

In all individuals that have yet been examined, the Cœliac rises from the Sternal aspect of the Aorta, where it enters the Abdomen between the two Crura of the Diaphragm. Its origin, therefore, is *atlantad* of the Pancreas, *sacrad* of the Liver, *dorsad* of the Stomach, and *dextrad* of the Spleen, in the close vicinity of the two Capsulæ Atrabiliariæ, of the two Semilunar ganglions, and of the Superior Mesenteric Artery, which rises near it, though very seldom rises along with it by a common trunk (i). Immediately almost after its origin, it divides into branches, though in no regular or determinate manner. It occasionally sends off Capsular branches, and more frequently than the Aorta, the Phrenic branches that are ramified

(i) Several Anatomists, mistaking the ambiguous language of Galen, had described these Arteries as rising regularly by a common trunk. Haller, believing in 1745, that this never happened, observes, when treating of the Mesenteric in his third Fasciculus, p. 44. "Unica est perpetuo et æque diversa a "Cœliaca." But, in 1756, in his eight Fasciculus, recommends the following addition to be made: "Semel tamen A. 1751. communi trunco natam vidi." P. 35.

on the concave side of the Diaphragm. The organs which in general are wholly supplied from this source, are the Stomach, the Liver, (*h*) the Spleen, and Epiploon, named *Gastro-Hepatic*; those that derive from it only a partial, though regular supply, are the Duodenum, the Pancreas, and Epiploon, termed *Gastro-Colic*. The principal branches are the Gastric, Hepatic, and Splenic; the Hepatic and Splenic, in every instance that has yet been observed, conveying a portion of their blood to the Stomach.

ARTERIÆ GASTRICÆ.

THE term *Gastric*, in a general sense, is equally applicable to all the branches ramified on the Stomach; but is usually restricted to the branches that enter at the concave arch, where the Gastro-hepatic Epiploon is attached. These branches, whether they arise near the confines of the Stomach from a common trunk, whether at a distance from different sources, or whether they be two or more

(*h*) Haller mentions one case in which the Superior Mesenteric furnished the whole of the Hepatic branches. “*Ut omnino nihil Hepati Cœliaca daret;*” but, so far as I know, this is the only instance on record. See *Fascic. viii. p. 36.*

in number, are seen extending along the concave Gastric arch, *sinistrad* towards the Cardia, and *dextrad* towards the Pylorus and the Duodenum. As they advance in these opposite directions, they send Ramuli from one of their sides to the smaller Epiploon, named Gastro-hepatic, and from the other, branches that spread on the Sternal and Dorsal aspects of the Stomach, continuing their course towards the convex Gastric arch, till they meet with branches from the Vasa Brevia, and from the two Gastro-epiploics, furnished by the Splenic and Hepatic Arteries. In this distribution, the branches *sinistrad* towards the Cardia, naturally inosculate with the last Œsophageals and Ramuli of the Phrenics; while the branches *dextrad* towards the Pylorus, if they do not extend their ramifications, upon the Duodenum, and head of the Pancreas, yet naturally inosculate with the branches distributed on these organs.

It frequently happens that an Hepatic, and sometimes a Phrenic, arises with one of these Gastric branches from some of the larger divisions of the Cœliac; in that case, the Anatomist, fond of novel distinctions, and of perpetuating his remarks by names, extends the appellation of the common trunk to the larger branch, and as the two often vary in

proportion from different causes, the Gastric branch is sometimes said to give off the Hepatic; the Hepatic sometimes to give off the Gastric; the Gastric, the Phrenic; and the Phrenic, the Gastric, just as the one or the other at the time happens to predominate in point of magnitude.

The reader who is anxious to know the names that have been given to the Gastric branches, will find a number of the most important in the note below *.

* A branch running along the concave arch of the Stomach towards the Cardia, is named *Coronaria Superior* by HALLER and COWPER, *Gastrica Major* by BAUHIN, DIEMERBROECK, and others, *Gastrica* by GLISSON, *Epigastrica* by LOWER, *Gastrica Sinistra* by KEIL, *Gastrica Superior* by WALTHER. Such a branch has sometimes been observed sending off an Hepatic Artery, when, in the opinion of Walther and Haller, it ought to be named *Gastro-hepatica Sinistra*. It has sometimes been observed sending off one of the Phrenics, when, by parity of reason, it ought to be named *Gastro-phrenica Sinistra*. A *Gastrica Sinistra* of BAUHIN, is supposed by Haller to have been the same as a *Ramus Dexter* of his *Coronaria Superior*, a branch towards the left of the Stomach, although to the right of the Coronary trunk.

A branch running in an opposite direction towards the Pylorus, and on the same side of the arch, is named *Coronaria Dextra* by HALLER, *Pylorica* by GLISSON, *Gastrica Dextra* by VERHEYEN, and others. A *Gastrica Dextra Minor* of WALTHER, is supposed by Haller to have been the same as his *Pylorica Superior*, the *Gastrica Dextra* of WINSLOW, LIEV-

ARTERIÆ HEPATICÆ.

SEVEN times in thirty Haller saw the right lobe of the Liver supplied by a branch, that, rising from the Superior Mesenteric, run *dorsad* of the right extremity of the Pancreas, towards the Fossa of the Vena Portæ (*l*) ; and at one time, saw the Superior Mesenteric supply all the Arteries of the Liver (*m*). In general, however, the Liver is supplied from the Cœliac Artery by a branch that divides towards

TAUD, KULM, and BOUDON, the *Gastrica Major* of SPIGELIUS, and the *Coronaria Inferior* of COWPER, the same as the *Gastro-epiploica Dextra* of BAUHIN, DIEMBERBROEK, GLISSON, HEISTER, and others. Haller has mentioned an *Epi-ploica posterior*, LIEUTAUD an *Epi-ploica dextra* and an *Epi-ploica parva*, different from all these previous branches.

The *Pancreatico Duodenalis* of HALLER, the *Duodenal* of WINSLOW and LIEUTAUD, and the *Intestinalis* of BAUHIN, though a small branch running along the concave side of the second, and a part occasionally of the third flexure of the Duodenum, is made by Haller, the trunk of the *Gastro Epi-ploica dextra*, not on account of its size, for it is smaller than its branch, but on account of its direction. The confusion of language is beyond a parallel, when we come to name the fleeting varieties, in number, origin, and ramification, that are exhibited by the smaller *Pyloric*, *Duodenal*, *Pancreatic*, and *Cystic* branches.

(*l*) See Fascic. ii. n. O. ad Tab. 1. Arteriæ Cœliacæ, and Fascic. iii. n. 6. p. 45.

(*m*) See Note, page 178.

right and left, on approaching the Fossa of the Vena Portæ; by a branch that has an earlier division; or occasionally by two or more separate branches, some proceeding directly from the Cœliac, or from a trunk common to them, and to either a Phrenic or a Gastric branch. They usually enter at the transverse Fossa, or Fossa Vena Portæ, the left at that extremity of the Fossa which terminates in the Fossa Umbilicalis; branches too have occasionally been seen entering the Fossa Ductus Venosi, or that seeming continuation of the Fossa Umbilicalis between the left Lobe, and the Lobulus Spigelii. Previous to their entrance, those which are adjacent send branches to the Vesicula Fellis, the Ductus Cysticus, and Ductus Hepaticus; some send Ramuli to the Ligamentum Suspensorium, that inosculate with Ramuli of the Sternal Arteries, and some Ramuli that inosculate round the Coronary Ligament with Ramuli from the Phrenics.

From one of the larger Hepatic branches towards the right, or sometimes from the Trunk of the Cœliac itself, a conspicuous branch is seen running *dorsad* of the first portion of the Duodenum, and passing that portion, is seen again reflected, *sinistrad*, upon the convex Gastric arch, where the Gastrocolic Epiploon is attached. This branch, where it runs

on the Stomach, being generally steady and uniform in its character, has very properly received a name, and is called the *Gastro-epiploica Dextra*. In its course, it sends branches to the Duodenum and Pancreas; and from a prevalent, but unjustifiable practice of describing portions of the same vessel as separate Arteries, at one part, it has sometimes been named the *Pancreatico-duodenalis*, and described as a branch of that very Trunk, of which it is evidently the continuation (*n*).

Where it runs on the Stomach towards the left, it sends out a number of lateral branches to be ramified on the Gastrocolic-epiploon, and lateral branches from its opposite side to be ramified on the Stomach; some spreading on the Sternal aspect, and some on the Dorsal, till they meet and inosculate with similar branches proceeding from the concave arch. After sending forth these lateral branches, it is ge-

(*n*) *Pancreatico Duodenalis*, dum retro Duodeni principium, ante Pancreas descendit, dat ramos ipsi duodeno, alios parvos, alios longiores, ad flexionem transversam primam: Ubi autem finem inferiorem est emensa Duodeni, vel paulo supra dat ramos *Pancreaticum transversum* quem alias Mesenterica producit.—Ad sinistra educit eadem *Pancreatico-duodenalis*, ad rectum angulum, magnam *Gastro-epiploicam Dextram*, &c.”—*Haller, Fascic. ii. N. q. et r. ad Tab. 1. Arteriarum Cœliacæ.*

nerally seen continued (*o*) into the Gastro-epiploica Sinistra, that rises from the Splenic branch of the Cœliacæ.

In some cases, this Artery has inosculated, near to the right extremity of the Pancreas, with a branch from the Superior Mesenteric, as large, or even larger than itself, presenting an appearance, which made Haller doubtful whether he should view this Gastro-epiploic as a branch of the Cœliac, or Superior Mesenteric (*p*).

ARTERIA SPLENICA.

THE separate origin of this Artery from the Aorta, as seen by Drelineourt, Tulingius, and others, had

(*o*) “ *Gastro-epiploica Dextra*, omentalibus datis et ventricularibus, et surculis numerosis ad glandulas, quæ in ea curatione jacent, absumtis, ultimo occurrit ramo dexterrimo *Gastro-epiploicæ Sinistræ* et cum ea continuatur. *Eust. T. ix. f. 2. Tab. xxvii. f. 2. Winslow, n. 185. Licutaud. Lecon-ccna* in *Phil. Trans. n. 280.* (Cujus icon cæterum multis modis vitiosa est.) Alias non trunco, uti neque *Eust. Tab. xxvii. f. 4.* neque *Vesalius* habet, sed ramo aliquo hæc communicatio perficitur : Uti obscuram vidit hanc communionem, *Cl. Hebenstreitius.* Sed Anastomosis frequentior est.”—*Ibid. l. p.*

(*p*) Alluding to this Mesenteric branch, Haller says, “ Vidi hunc ramum communicantem majorem fuisse illo, cum quo convenit, Cœliacæ ramo, ut *Gastro-epiploica*, a Mesenterica potius quam, a Duodenali Cœliacæ oriretur. Id etiam *Winslow* contigit.”—*Fascic. iii. p. 45.*

never at any time been observed by Haller. It generally rises from the Trunk of the Cœliacæ, or rises as a branch from one of its divisions; it is usually smaller in the young subject than the common trunk of the Hepaticæ, when there is such a trunk; but usually larger than that Artery in the adult. It runs first *sinistrad* and *sacrad*, then *sinistrad* and *atlantad*, and, during a great part of the course, runs near the Atlantal margin of the Pancreas, to which it gives out numerous branches, and branches sometimes to the Mesocolon. When it approaches the seat of the Spleen, where that is attached to the Gaster or Stomach, in the line of the Gastrocolic-epiploon, it enters the concave side of that Viscus by several branches indefinite in number, and either directly, or through these branches, gives out other branches to the Stomach, under the name of *Vasa Brevia*. These *Vasa Brevia* spread on the left extremity of the Stomach, and anastomose on the Sternal and Dorsal aspects with the neighbouring Gastrics. The Splenicæ send another branch to the Stomach, which is named the *Gastro-epiploica Sinistra*. This branch runs *dextrad* along the convexity, where the Gastrocolic-epiploon is attached. It is afterwards continued into the *Gastro-epiploica Dextra*, and sends off branches in a similar manner to the

Stomach and Gastrocolic-epiploon. It rises sometimes from the Splenic Artery, as that is coasting along the Pancreas; sometimes appears the division of the Cœliac, from which the Splenic branches originate; sometimes again has its place supplied by two more branches running along the Epiploon to the Stomach, and called the *Gastro-epiploicæ Sinistræ* (q).

As the distances and positions of the Spleen, must vary with the different states and positions of the Stomach, this Artery takes a flexuous course, and is made to be easily elongated or shortened, according to circumstances. Its flexures, observed previous to injection, are always conspicuous when the injection is propelled with more than ordinary force. The force which thus elongates the Artery, at the same time increases its diameter, and provides a remedy against the excess of intuspectus or quantity, by an additional extent of the flexures,

(q) "*Gastro-epiploica Sinistra.*—Ea Arteria, antrosum. "emergit et deorsum, magnoque ambitu ventriculum, a quo "remota est, longis tribus quatuorve posteriori omenti faciei "innatantibus flexuosis ramis adit, neque unum plerumque "truncum habet, parallelum ventriculo, uti dextra solet *Gastro-epiploica*. Alias ut in hac Icone. (Tab. 2. Arteriæ Cœlicæ) "cadem verus truncus est Splenicæ, tuncque *Lienales* ipsi pro "ramis sunt."—*Fascic. ii. N. g. ad Tab. 2. Arteriarum Cœliacæ,*

ARTERIA MESENTERIC MAJOR,

seu

Superior.

THIS Artery rises from the Sternal aspect of the Aorta, in the immediate vicinity of the Cœliac, and often so near, that Galen's description, if not carefully examined, might seem to imply that they generally originate by a common trunk. Riolan, a devoted admirer of Galen, and some other compilers from books, described this origin as the regular appearance; but their description imposed upon few. The error was detected by Jacobus Sylvius, Vesalius, Columbus, and other Anatomists. In 1745, the illustrious Haller was of opinion, that such an origin never had occurred; but afterwards acknowledged that he had met with a solitary instance in 1751 (r.) Allowing the case to be extremely rare, it is natural to suppose, upon the general principles of analogy, that the two Arteries, from their close vicinity, must often inosculate

(r) See *Fascic. iii. p. 44. n. 6.* and *Fascic. viii. p. 85. n. 11.*

through the medium of their branches, and that occasionally branches from the one may supply the place of branches from the other. Besides the branches which this Artery does not unfrequently send to the Liver, and besides its branches that anastomose with Cœliac branches, near to the right extremity of the Pancreas, I have seen a branch, as large as a crow quill, arising from the root of the Gastric branch, and, after giving out two or three Ramuli to the Pancreas, entering at the root of the first branch that was sent to the Colon.

The parts on which it is regularly distributed are the Pancreas, the Duodenum, the Jejunum, the Ileum, the Caput Cæcum Coli, the Appendicula Vermiformis, the right Colon, and the transverse Colon; in short, the whole intestinal canal, excepting the left Colon and Rectum, the first of these receiving all its principal branches from the smaller Mesenteric, and the second from that and the Hypogastric.

The order in which these branches arise, is in some respects different from that in which the several portions of Intestine succeed one another. The first branches are sent to the Pancreas and Duodenum, where they communicate with branches from the Cœliac; the next to the transverse and

right Colon, and then come the branches distributed to the Jejunum and Ileum.

The course of the Trunk, and the mode in which it gives out these branches, have generally a distinct and permanent character. Proceeding from its origin, it runs first *dextrad* and *sacrad* behind the Pancreas; emerges next from beneath the margin of that Gland; then passes *sternad*, and within the duplicature of the Mesocolon, and where that crosses the last flexure of the Duodenum, enters the duplicature of the Mesentery, where in future it regulates its course by the direction of that membrane, within whose folds it forms a curve, with its convexity towards the viscera.

From the convexity of this curve, or from the side on which this convexity is situated, proceed in general all its branches, excepting sometimes a branch or branches to the right Colon from the concave side, and a branch to the transverse Colon on the left, which last branch sometimes proceeds neither from the concave nor convex side; but from that side whose aspect points *sinistrad* and *dorsad*.

The branches to the Colon, measuring from the Trunk, are generally among the largest and longest, and the rest, particularly from the middle of the curve, smaller and shorter to its termination. As

they proceed to their destination, the contiguous branches inosculate laterally by others not inferior, or but little inferior to themselves in size. The inosculation form arches whose convexities are pointed towards the intestines; from the convexities of these arches, other branches originate and inosculate by arches in a similar manner, till in some places, where the Mesentery is broad, there are seen no fewer than four or five series of arches, one above the other; the arches becoming smaller and smaller in proportion as the vessels decrease in diameter, the largest branches at the commencement always forming the largest arches. On taking a side view of the whole, they suggest the idea of a piece of network, where the threads and the meshes gradually diminish in the same proportion. From the convexities of the last arches, small branches enter the concave side of the intestine, after previously dividing into two that are smaller. These last run on the opposite sides of the Tube, and spread into ramuli that meet and inosculate at the convex side, having inosculated during their progress with lateral Ramuli of the same side.

The branch to the left of the transverse Colon anastomoses with a large branch of the smaller Mesenteric, and forms what is called the *Great*

Mesenteric Arch. The other inosculations I shall mention under the Lesser Mesenteric.

ARTERIA MESENTERICA MINOR,

seu

Inferior (s).

THIS Artery, says Haller, making the remark in 1747, has enjoyed a singular degree of good fortune. A rare instance amidst the instability of human affairs, it still continues to retain the name that was first imposed by Jacobus Sylvius, while, for two centuries, it has neither become a subject of controversy, nor suffered any change in the way of description. Schelhammer, however, he candidly acknowledges, objected to the name, as it sends no branches to the Mesentery, considered as distinct from the Mesocolon; he admits also that not only Verheyen, but a few others, have called it *Hemorrhoidal*; that Eustachius has combined it in his figure with the larger Mesenteric; and that, in

(s) “*Mesenterica inferior rara felicitate usa est, ut parco in rebus humanis exemplo a duobus seculis nullam omnino passa sit aut in nomine, aut in descriptione aut mutationem, aut controversiam.*”—*Fascic. viii. p. 49. n. 12.*

the figure given by Casserius, its form and principal anastomosis are misrepresented. Haller himself, yielding to the reasons advanced by Schellhammer, thinks it should be called, and has actually called it *Colica Sinistra*. In his opinion, he has made this change agreeably to the laws which regulate the Nomenclature of Linnæus. The name, if adopted, would certainly distinguish it from what he has called *Colica Dextra*, and *Colica Dextra* would seem to imply, that there is also a *Colica Sinistra*. But was there any kind of necessity for such a name as *Colica Dextra*? Did Linnæus ever impose names upon the mere varieties of species? or would he have classed a varying branch of the larger Mesenteric with a primary branch from the Aorta, bearing a steady and uniform character?

If this Artery has suffered little change in the way of description, it partly has been owing to its steadiness of origin, and general distribution, and partly, too, to what may be thought a rare instance of prudence in Anatomists, their attending more to its general character, than to individual and trifling varieties occasionally occurring in its smaller branches. As some apology for Haller's appellation, the *Colica Sinistra*, which naturally suggests an

idea of relation between it and the Colica Dextra, it must be confessed, although he has no where, so far as I know, made the remark, that the Arteries distributed to the larger Intestine, exhibit an appearance obviously different from that of the Arteries distributed to the Duodenum, Jejunum, and Ileum. The branches destined for the large intestine, whether from the larger or smaller Mesenteric, are always proportionally larger in size, fewer in number, diverge to greater distances in their course, and form arches of a wider span, and divide later into small Ramuli, than those distributed to the small Intestine.

Where the Aorta divides not so high as the Renal Arteries, a case of extremely rare occurrence, the smaller Mesenteric regularly rises from its Sternal aspect, a little to the left, in the space interposed between the Renals and the common Iliacs: It divides soon into what are comparatively large branches, destined to the left Colon and Rectum. They form arches, like those to the right and transverse Colon; while the most atlantal, inosculating with the branch of the larger Mesenteric that is ramified on the transverse Colon to the left, constitutes the Great Mesenteric Arch. The branch that is ramified upon the Rectum, runs longitudinally on its

Dorsal aspect, inosculates with branches from the two Hypogastrics, and, though seldom extending its ramifications so far as the Sphincter, has its ultimate branches enumerated among those that are termed *Hæmorrhoidal*.

The extreme vessels of the two Mesenterics, where they scarcely are visible to the naked eye, have been traced by the assistance of the microscope, penetrating *centrad* through the nervous coat, and exhibiting beautiful retiform textures upon the villous or internal coat. The honour of tracing them is due to the patience and industry of Liberkuhn. By aqueous injections, it has also been shown that they open by numerous exhalant vessels upon the concave surface of the Tube, which, in the morbid states of the Viscera, accounts for the frequent and copious discharges of fæcal matter, that cannot be ascribed to the previous ingesta (*t*).

(*t*) In restoring the Stomach and the Intestines to their natural functions, much of the utility of purgative medicines may consist in removing the morbid and noxious matter, thus exhaled from the internal coat of the Intestine. The advantages resulting from the use of purgatives have been partially known from the earliest periods in the history of Physic. A clear, extensive, and systematic view of their utility, of the diseases to which they are applicable, and the various circumstances by which their exhibition ought to be regulated, was first given by Dr.

At these portions of the Intestine, which are closely attached to the Parietes by the Peritoneum, as the Duodenum, the Rectum, the Caput Cœcum, and the Colon at its right and left Ligaments, the Mesenterics naturally inosculate with adjacent Arteries, whether these happen to be Capsular, Pancreatic, Renal, Lumbar, Spermatic, Ureteric, or Hæmorrhoidal; the vessels to the transverse part of the Colon, inosculating likewise, in the same way, with branches proceeding from the Gastro-epiploics.

ARTERIE RENALES.

THESE are usually two in number, arising laterally from the Aorta; but nearer to its Sternal than its Dorsal aspect, and between the larger and smaller Mesenteric. Their course to the kidneys is *laterad* and *sacrad*, at considerably less than a right angle.

HAMILTON, Sen. of Edinburgh, Senior Physician to the Royal Infirmary. His work contains a summary view of his observations in extensive practice for more than a period of thirty years, and is certainly a novelty amidst a number of the Medical productions of the present day, which are published as Advertisements, in the form of volumes, to acquaint the Public, that the author has entered upon his profession, made some observations, got some theories, has some abilities, and would be glad to extend farther his experience and practice.

Haller says, at less than half of a right angle (*u*) ; but his figure is contrary to his observation. Sabatier, Portal, Boyer (*v*), and the Continuator of Bichât, have seen the left higher than the right in point of origin. Haller, however, represents the right as higher than the left, as Eustachius more generally found it ; Portal has seen both rising together by a common trunk (*w*).

(*u*) “ In numero utique ludunt. Naturaliter utraque unica est, eaque non ad rectum angulum, ut vulgo scribitur, sed ad satis insignem, semirecto tamen minorem, descendit ex Aorta. Continuo sub Mesenterica, &c.”—See *Fascic. viii. Tab. 1.* I suspect *minorem* is here by mistake written for *majorem*.

(*v*) “ La Rénal gauche naît ordinairement plus en devant et plus en haut que la droite.”—*Sabatier*.

“ Celle du côté droit vient ordinairement de l’Aorte un peu plus bas que la gauche.”—*Portal*.

“ La Rénale gauche naît communément plus en devant et un peu plus haut que la droite.”—*Boyer*.

“ Souvent la Rénale gauche naît un peu plus haut que la droite.”—*Bichât, Anat. Descrip.*

Have these Anatomists transferred to the Arteries, what was meant of the kidneys, in the remarks on figure 1. Tab. xii. of Eustachius ?

“ *A.* Ren dexter est major, quam *Æ.* sinister, parte superiore uterque æqualem fere altitudinem habet : sinister enim nonnihil dextro est clatior, inferiore, dexter sinistro humilior est, et hoc evenit propter magnitudinem ; cujus causa sinister altior dextro dici potest.”

(*w*) “ J’ai vu ces deux troncs réunis en un seul, qui sortoit de la face antérieure de l’Aorte à très peu de distance de la Mesentérique Supérieure.”

From the relative situation of the Aorta to the Mesial Plane, at the place of their origin, the left is always shorter than the right, and the variety of Renal branches, according to Soëmmerring, but not according to Eustachius or Haller, usually greater on the left side than upon the right (*x*).

They divide into branches sometimes upon their entering the kidneys; sometimes before they enter the sinuses; and sometimes very near to the place of their origin from the Aorta. At other times, though by no means frequently, these branches arise in the form of Trunks by separate origins, to the number of three, four, or five; some arising from the Aorta, nearly as high as the Mesocolon; some from the angle of its division; some again from the common Iliac; and, in rare cases, from the Hypogastric (*y*). After entering the kidneys, some of them are seen, though only occasionally, inosculat-

(*x*) “*Arteria Renalis Sinistra* interdum triplex est, quin quadruplex. *Arteria Renalis Dextra* longior est Sinistra et profundior exit. Raro duæ, tres, quatuor, aut quinque deprehenduntur.” *Soemmerring*. But see *Haller, Fascic. iii. p. 59*.

(*y*) See *Haller, Fascic. iii. p. 58 and 59*. See also *Eustach. Tab. xii.* where some of the figures represent the Arteries as entering at several different parts, besides the sinuses, with the Veins and Ureters, likewise coming out at different parts.

ing by arches, as they diverge from the centre *peripherad*. Their divisions increase rapidly in number, and are generally so minute in the cortical substance, that many refuse to admit the injection ; while the injection of those that admit it, is washed off with the Parenchyma in corroded preparations.

In their course, they send off Capsular branches, the right not unfrequently one of the Spermatics, and both of them branches to the adipose substance ; some of which have occasionally been observed passing through the kidneys.

ARTERIE SPERMATICÆ.

THESE are the Arteries ramified on the Testes, the organs which secrete the Spermatic fluid. They rise in the neighbourhood of the Renal Arteries. In eighteen cases out of thirty, Haller observed them taking their origin from the Aorta, where they usually rise from its Sternal aspect, not regularly opposite, but sometimes the one more *atlan'ad* than the other. Proceeding at a very acute angle from the Aorta, they pass obliquely over the Ureters, and, running on the Sternal aspect of the Psoas, *dorsad* and *peripherad* of the Peritoneum, they at last approach the ligament of Poupart, when they take a turn *sacrad* and *mesiad* ; cross the Epigastrics on their Sternal aspect, and, entering what is called the Abdominal

Rings, with the Cremasters and Spermatic cords, accompany them to the Testes, where they send out their ultimate branches, entering the Testes upon that side where the Tunica Albuginea is reflected from the Tunica Vaginalis (z).

When they do not originate from the Aorta, they rise from the Capsular or Renal branches; from some of the Lumbar; from the common Iliacs; from the Hypogastrics; or from the Epigastrics (a). The explanation of these origins is not difficult: From the original situation of the Testes in the neighbourhood of the Kidneys, they, agreeably to the principles of general analogy, receive branches from

(z) The Tunica Albuginea is the Peritoneal coat which the Testes had when lodged in the cavity of the Abdomen; the Tunica Vaginalis, the Peritoneal Sac which the Testis carries down with it into the Scrotum. The Tunica Vaginalis is, therefore, nothing more than the Hernial Sac of the Testis, and, if not closed, becomes a Hernial Sac of the Intestine, as in *Hernia Congenita*.

(a) See *Haller, Fasci. iii. p. 60*. See also his edition of the *Prælectiones Academicæ* of Boerhaave, vol. v. p. 1. § DCXLI. n. a.

“ On a vu les Artères Spermaticques sortant des Artères Lombaires; outre les Artères Spermaticques connues, on trouve quelquefois d’autres branches Artérielles qui parviennent aux testicules, et qui sont fournies par les Artères Lombaires; par les Iliques primitives, ce qui est rare; par les Artères Epigastriques, ce qui est plus rare encore, mais c’est ce qui a été observé.”—*Portal*.

Mayer saw one from the Hypogastric.

adjacent Arteries, as the Aorta, the Renals, and Capsulars. Descending afterwards to their ultimate destinations, the primary Arteries naturally inosculate with the branches in their course, as with branches from the Lumbar, the Iliac, Hypogastric, and Epigastric Arteries ; and when it happens that the Primary Arteries are obliterated or obstructed, a communicating branch, or communicating branches, naturally succeed in performing their functions. As magnitude likewise, in various places, is compensated by number, we occasionally see two, sometimes three Spermatic Arteries on the same side, instead of one of a larger size. One or two deriving their origin from the Aorta, and the other, or others, either from a Renal or Capsular branch, or from some other Artery that lies contiguous to the usual course.

When they rise high, they have been seen giving branches to the Pancreas, and the Dextral some branches to the Liver ; they have also been seen giving out branches to the Duodenum, and generally branches to the adipose substance surrounding the kidneys ; to the Ureters, and to the Lumbar Glands ; branches that inosculate on the left side with some branches near the Parieties from the smaller Mesenteric ; and branches on the right side that inosculate with branches of the larger Mesenteric at

the Caput Cæcum. When they pass the Rings, they send branches to the Spermatic cords and Cremasters; branches to the Scrotum which inosculate with the Pudics, and on its Septum with one another, and at last, before entering the Testes, numerous branches to the Epidymides.

It has been remarked, that, during their progress, they are rather increased than diminished in diameter, which partly may be owing to the additional influx of blood from communicating branches; partly too to their serpentine flexures obstructing the force and momentum of the blood; while the serpentine flexures, and their singular length compared to their size, may be useful for the purposes of seminal secretion. In the Sheep, for instance, where the serpentine flexures are wanting in the Veins, their place is supplied by a Rete Mirabile of small vessels, like what Mr. Carlisle observed in some Arteries of the Lemur Tardigradus, and other animals of slow motion.

In the Female, the Spermatic Arteries enter the broad ligaments of the Uterus, where they spread out their branches upon the Ovaria and Fallopian Tubes; sending a few to the round ligaments and the Fundus Uteri, where they inosculate with Uterine branches.

ARTERIÆ CAPSULARES.

THESE Arteries are distributed to the organs called *Capsulæ Atrabiliaria*, from an idea that they were Glands that secreted black bile; *Renēs Succenturiati*, from an opinion that they assisted the Kidneys in their functions; and *Glandulæ Suprarenales*, from their lying *sternal* upon the Atlantal extremities of the kidneys. Whatever be their office, they are proportionally larger in the Fœtus than in the Adult, and supplied by Arteries from various sources; from the Cœliac, the Aorta, the Phrenics, the Renals; sometimes from the Lumbar; and sometimes, says Soëmmerring, though certainly not according to general analogy, from the Epigastrics (*b*). They have been observed on the right side sending Ramuli to the Duodenum, to the Liver, and to the Hepatic flexure of the Colon; on the left side, to the Mesocolon, the Splenic flexure of the Colon, and the Spleen (*c*); on both sides branches to the Diaphragm, and occasionally one of the Spermatic Arteries. As they

(*b*) “ Interdum ex Arteria Epigastrica in uno vel utroque “ latere nascuntur;” probably some inosculating branches of the Epigastrics enlarged, and extended to the Capsulæ Atrabiliaria.

(*c*) See *Haller, Fascic. iii. p. 57.*

vary their size with the size of the organ on which they are ramified, their variety and extent of ramification will be different at different periods of life ; so that what may seem the trunks at one period will appear only the branches at another. It is thus we can explain, why Anatomists describe the same Artery as sometimes the trunk, and sometimes the branch of another Artery ; why Phrenic Arteries are said at times to give out Capsulars, and Capsulars in their turn to give out Phrenics. In the Fœtus, where the Capsulars are so large in proportion, Portal has seen a Capsular branch from the Renal Artery, as large as the Renal Artery itself, and sometimes, he adds, even larger than the Renal (*d*).

ARTERIÆ ADIPOSÆ.

THE Kidneys are enveloped in adipose substance, and the Arteries sent to it have thence been named *Arteriæ Adiposæ*. Like the Capsular Arteries, they

(*d*) To speak of a branch being larger than its Trunk, is not usual, nor is it accurate. But Portal's words are, " Cette Artère des corps sur-rénaux et dans le Fœtus pour le moins aussi grosse et quelquefois davantage que l'Artère Rénale qui la fournit ; elle diminue de grosseur après la naissance de l'enfant, de même que le corps sur rénale, en même temps que l'Artère Renale s'amplifie ainsi que le rein dans lequel elle se distribue."—*Portal Des Artères Rénales*.

arise from several different sources, from the Aorta, from the Phrenic, the Renal, Spermatic, Capsular, and Lumbar branches. Haller saw an adipose branch from the last Intercostal; a branch which was also extensively ramified on several other parts (*e*). Some of them are seen occasionally passing from the adipose substance into the Kidneys, and others from the Kidneys to the adipose substance.

ARTERIÆ URETERICÆ.

THE Ureters are the tubes by which the urine is conveyed from the Kidneys to the urinary bladder. Their Arteries are distinguished by the epithet *Ureteric*. They receive ramuli from most of the Arteries adjacent to their course, from the Aorta, from the Renal, Capsular, the Adipose, Spermatic, the common Iliac, the Hypogastric, and Vesical branches (*f*).

ARTERIÆ LUMBALES.

THESE are the Arteries which rise laterally, in the Lumbar region, from the Aorta, to be afterwards distributed upon the Parietes of the Abdomen. In many respects, they resemble the Intercostals ramified upon the Parietes of the Thorax. They rise

(*e*) See Haller, *Fascic. iii. p. 60.*

(*f*) *Fascic. iii. p. 61 and 62, and Fascic. viii p. 39.*

similarly from the Aorta, and generally in pairs; though it sometimes happens that two on the same, and two even on the opposite sides, arise together by a common trunk. Like the Intercostals, they send branches to the Vertebral column, the Vertebral tube, and the parts within it (*g*); send branches *peripherad* to the muscles and the Incumbent Integuments, turn round by the lateral aspects, and, as they are situated, inosculate with branches of the Sternal Arteries, with lateral branches of the Epigastrics, or with branches from the Circumflex Iliacs. In their course, they regularly communicate with their fellows of the same side, but without dividing like the Intercostals. Their number varies along with the number of the Lumbar Vertebrae; and even when the number of Vertebrae is regular, Anatomists differ as to the number of the Lumbar Arteries in their mode of reckoning. Those who reckon, among the Intercostals, the branch that follows the Sacral margin of the last rib, have five pairs; while those who restrict the epithet *Intercostal* to the branches that run in the Costal interstices, have a pair more. Haller adopts the last mode of reckoning, and has six pairs. These pairs he describes separately, though few of them differ in any obvious or per-

(*g*) See Intercostals.

manent characters. All of them run *dorsad* of the Psoas, *sternad* of the Quadratus Lumborum, and penetrate the Transversus Abdominis. Those that are adjacent inosculate with Capsular and Renal branches, and with small branches from the Mesenterics, where these are ramified near the Parietes, or Mesenteric Glands. The first, according to Haller's reckoning, runs *dorsad* of the Crus of the Diaphragm, to which it sends branches that inosculate with the Phrenics, proceeds *laterad* between the Psoas and the Quadratus, and, turning round with the curvature of the rib, naturally inosculates with the last Intercostal. On the right side, Haller has observed it sending branches to the Liver ; and not only Lieutaud, but G. Blasius and C. Bartholin have mentioned Phrenics from the neighbouring Lumbar. The fourth and fifth give branches to the Iliaci Interni, that inosculate with branches from the circumflex Iliacs ; they give also branches to the crests of the Ilia, that inosculate with branches from the Gluteals. The sixth has a character peculiarly its own. It sometimes rises from the common Iliac, from the Hypogastric, from the Iliolumbar ; and is sometimes absent, when its place is supplied by branches proceeding from a neighbouring Lumbar, from the Iliolumbar, or a Sacrolateral.

ARTERIES

OF THE

PELVIS AND SACRAL EXTREMITIES.

AFTER supplying the Abdominal Viscera, and the greatest part of the Adominal Parietes, the Aorta arrives at the last but one of the Lumbar Vertebrae, and there resigning its form and its name, divides at once into three branches: one of them called the *Sacromedian*, small in diameter, short in its course, and proportionally limited in its ramification; the other two equal in size, but so large and so long, that few Anatomists have taken them in with the eye or the fancy at one view, contenting themselves with examining their several parts in succession, to which they give names, but without venturing on a name for the whole, Anatomists here having been probably under the influence of certain habits previously acquired. The two lateral bones of the Pelvis, although they correspond to the two Scapulæ, are

usually considered as a part of the trunk, and in the languages spoken by the people, there is seldom any general term which has an allusion at once to the Thigh, the Leg, and the Foot. There is certainly not a term in the Greek or the Latin language which, strictly or classically, conveys such a meaning. If the word *Skelos* (*h*) has been made to convey it, it is chiefly upon the authority of Galen, who has changed the usual and original import; and if *Crus* and *Cruralis* have been made to convey it, it is upon no better authority than that of his translators. But, instead of objecting to such an authority, I would rather appeal to it, and thus extend the epithet *Crural* to the whole Artery of the Sacral extremity, from its commencement in the Aorta, to its termination.

In adopting, however, this general term, I mean not entirely to lay aside those numerous distinctions to which Anatomists have long been accustomed. In examining minutely a long chain composed of a great number of links, we ought not merely to have a correct idea of the whole, but also of every separate link that is of importance. After mentioning,

(*h*) Σκελος, according to Galen, includes the Μηρος, Κνημη, and Πους.

therefore, that the Sacral extremity is supplied entirely by one Artery, which I name the *Crural*, I shall describe its several divisions, and their ramifications, under different heads, not as separate and distinct Arteries, as is usually done, but as different portions of the same Artery.

Its first portion from the Aorta, running on the last of the Lumbar Vertebrae, to the junction of the Ilium and Os Sacrum, where it generally sends off the first large branch, I shall call the *LUMBAR PORTION*. It is usually termed the *Common Iliac Artery*.

Its second portion, extending from the junction of the Ilium and Sacrum, and along the Ilium, till it passes under the ligament of Poupart into the Groin, I shall name the *ILIAC PORTION*. It is usually called the *External Iliac Artery*.

Its third portion, where it lies in the Groin, and sends off the Inguinal pudics, if we are to admit such a division, may be termed the *INGUINAL PORTION*. It is usually denominated the *Common Femoral Artery*.

Its fourth portion, extending from the Groin along the Tibial aspect of the Femur to the tendon of the Adductor Magnus, where it ultimately leaves the Tibial aspect, might well enough be named the *FE-*

MORAL PORTION. It is generally named the *Superficial Femoral Artery*.

Its fifth portion, from the place where it passes through the tendon of the Adductor Magnus, to where it arrives between the heads of the Tibia and Fibula, may be denominated the POPLITEAL PORTION. Its usual name is the *Popliteal Artery*.

The fifth portion is the Cnemial Artery, usually called Tibialis Postica, which in the Sinuosity of the Os Calcis divides ultimately into two branches, which from being ramified on the sole of the foot, are termed Plantar Arteries.

If it were necessary to prefix Epithets to each of these portions, I should not hesitate to suggest the following: Cruri-Lumbar, Cruri-Iliac, Cruri-Inguinal, Cruri-Femoral, Cruri-Popliteal, Cruri-Cnemial.

ARTERIA SACRO-MEDIANA,

seu

SACRA-MEDIA.

THIS Azygous Artery, nearly as large as one of the Lumbar, runs along the Mesial line of the Os Sacrum, and not unfrequently continues its course to near the extremity of the Os Coccygis. During

its course, it sends off laterally undulated branches to inosculate with branches from the Sacro-laterals; and branches to the Rectum, which sometimes, when large, extend as far as the Urinary bladder. Meeting at last with the two Sacro-laterals, where they generally converge to form an arch on the Os Coccygis, the three together form the convexity of this arch, send branches to the extremity of the Coccyx, and the parts adjacent, which are more or less extensively ramified in proportion to their size.

ARTERIA CRURALIS,

Lumbar Portion,

ILIACA COMMUNIS, *or* CRURI-LUMBALIS.

FROM the relative situation of the Aorta and Vena Cava; the left Crural, in the Lumbar region, continues on the left of the Crural vein; while the right, to arrive at a similar situation on its own side, crosses the *Cava* on the Sternal aspect. This portion seldom gives out any branches during its course, excepting ramuli to the Lumbar Glands, and the Ureters, very seldom a Lumbar, Renal, or Sperma-tic Artery. At its termination, it always sends off

a large branch, which, rising from its Dorso-mesial aspect, runs either near, or along the junction of the Ilium and Sacrum. This branch is termed the *Hypogastric* or internal Iliac; but with more propriety might be denominated the *Iliaca pelviena*, as the word *Hypogastric* is seldom if ever extended in its meaning, so as to include the lateral and dorsal regions of the Pelvis.

ARTERIA HYPOGASTRICA,

ILIACA INTERNA, OR ILIACA PELVIENA.

THIS Artery, running *dorsad* and *distad*, soon lays aside the form of a trunk, by dividing into many subordinate branches. The largest of these are the *Gluteal* and *Ischiadic*; and from these two, or directly from the trunk, issue the branches distinguished by the epithets, *Iliolumbar*, *Sacrolateral*, *Uterine*, *Vesical*, *Umbilical*, *Hæmorrhoidal*, *Pelvien-Pudic*, and not unfrequently the *Obturatoria*.

Iliolumbalis,

RISES sometimes from the Lumbar portion of the Crural Artery, runs *laterad* covered by the Psoæ, and distributes its branches to these muscles, the Iliacus

Internus, and Transversus Abdominis. It anastomoses with the Circumflex Iliac, and forms a curve immediately within, and nearly parallel to the crest of the Ilium. It sometimes gives ramuli that enter the Foramina of the Os Sacrum, always inosculates with branches from the Lumbar, and sometimes gives off the last of the Lumbar. It is the *Iliaca parva* of Winslow, Lieutaud, and others. Haller thought the term *Iliac* too frequently repeated, and chose to call it the *Iliolumbar* (i).

(i) This name is certainly an improvement, as the young Anatomist is apt to be embarrassed with an *Iliaca Parva*, an *Iliaca Communis*, an *Iliaca Externa*, an *Iliaca Interna*, an *Iliaca Postica*, and an *Iliaca Circumflexa*, *Antica*, or *Externa Minor*. At the same time, the confusion arises not so much from the repetition of the word *Iliac*, as from the careless use of the epithets *External*, *Internal*, *Anterior*, and *Posterior*.

What is called the External Iliac, is certainly as much within the Ilium, as the Hypogastric or Internal Iliac. The Gluteal Artery, which Haller has named *Iliaca Postica*, forgetting his reasons against the repetition of the term *Iliac*, extends only to the dorsum of the Ilium through the medium of its branches. The name too seems to imply, that there is likewise an *Iliaca Antica*, the name given by Portal to the Iliac Portion of the Crural Artery, by Boyer to the Circumflex Iliac, or the *Iliaca Externa Minor* of *Schaarschmid*.—*Haller, Fascic. v. p. 9.*

Dreading again the repetition of the term *Iliac*, Haller has given to the Circumflex Iliac the epithet *Abdominalis*, as if it were more an Artery of the Abdomen than the Cœliac, than any of the two Mesenterics, than any of the Lumbar, or the two Epigastrics. This branch, he observes, inosculates with an

Arteria Glutea.

THE largest branch of the PELVIEN ILIAC passes between the two great trunks of the Ischiadic nerve, and leaves the Pelvis at the highest part of the Iliac notch, to be ramified principally upon the muscles that are named *Gluteal*. In its passage outward, it sends a branch to the Os Ilium, and has scarcely emerged, when it divides into large branches, each of them taking a different direction from that of the trunk. These branches, in different places, are observed to inosculate afterwards by ramuli with one another, and approaching the confines of the Glutei, to inosculate also in a similar manner with the

Iliaca Antica Minor, (*Fascie. v. p. 9.*) from which it is evident, that his Iliaca Antica Minor is not the Circumflex; probably the branch to which he alludes in the first paragraph of Note 3, in the same page, an occasional branch, that rises very near to the Circumflex, and under the Integuments, ascends over the spine of the Ilium, and upon the lateral parts of the Abdomen; sometimes as far as the eighth rib, he had seen it at times taking its origin from the Deep Femoral. There are few students who can easily comprehend how the two epithets *External* and *Internal*, can strictly be applied to the same Pudic Artery, and few even who, from these epithets, can form any thing like an accurate notion of the relative situations of the Hemorrhoidals, which are all within the Pelvis.

neighbouring Arteries ; some of them inosculating in this way, near the crest of the Ilium, with the last of the Lumbar ; some on the Dorsal aspect of the Sacrum with the Sacro-laterals ; some upon the Gluteus Magnus and Pyriformis, with the Ischiadic ; some upon the Gluteus Medius, and near the Acetabulum, with the External Circumflex of the Femur ; and some, near the origin of the Sartorius, with the Circumflex Iliac.

The Iliolumbar, the Obturatoria, a Sacro-lateral, the Pelvien Pudic, and some Hæmorrhoidals, are not unfrequently among its branches, before it leaves the cavity of the Pelvis.

Arteria Ischiadica,

THE next in size to the Gluteal, but more in the general direction of the trunk, issues from the Pelvis between the Pyriformis and the Gemelli, and, like the last, immediately under the Gluteus Magnus. Its usual course, while it preserves the appearance of a trunk, is towards the space between the Trochanter Major of the Femur, and the Tuberosity of the Os Ischium ; but rather inclining to the Tuberosity.

It sends branches to the Pyriformis, the Gluteus

Medius, the two Sacro-ischiadic ligaments, the Coccygeus, the Levator Ani, the Gluteus Magnus, the Sacrum and Coccyx; the small branches to the Sacrum and Coccyx, communicating with branches from the Sacro-laterals on the dorsal aspect, and occasionally penetrating through the Foramina, or by the sides of the Sacrum and Coccyx into the Pelvis.

There is no Artery, not excepting the Pelvien-pudic, which is often its branch, and which takes for a while a similar course, that so conveniently supplies the Gemelli, the Quadratus Femoris, or the Ischiadic nerve, while that remains in the neighbourhood of the Pelvis. A branch accompanying this nerve a part of its way, and others accompanying the Gluteus Magnus to its insertion, have been seen inosculating with some of the branches of the highest Perforant, and with branches from the Internal Circumflex in the region of the Femur.

The branches ramified round the Tuberosity of the Os Ischium, naturally inosculate with branches from the Pudic, and distribute ramuli to the Tendinous origins of the Semitendinosus, the Semimembranosus, and to the long head of the Biceps; while the branches towards the Articular Capsule, Obturator Externus, and the Acetabulum, as naturally inosculate with branches from the Internal Circumflex and Obturatoria.

Before it leaves the Pelvis, it generally sends off Vesical branches; sometimes the branch which Haller has called the *Middle Hæmorrhoidal*; in rare cases, the Obturatoria, and frequently the Pudic. In more than one instance, I have seen the Pudic arising from it, after leaving the Pelvis, and nearly equal to it in size; an origin of the Pudic not unfrequently observed by Haller (*k*).

Arteriæ Sacro-laterales.

Two small Arteries, that run along the two lateral rows of Foramina on the Sternal aspect of the Os Sacrum. They send branches to the neighbouring nerves; branches *mesiad*, to meet the branches that are running *laterad* from the Sacro-median; branches to the sacral Vertebræ; branches through the Foramina of the Sacrum to the Cauda Equina; and branches passing through the Dorsal Foramina, to the Sacro-lumbalis and Longissimus Dorsi, where they meet with ramuli that derive their origin from the Gluteal and the Ischiadic. Having gradually been converging through the whole of their course,

(*k*) “Quando Pudenda Circumflexa. s. communis intra Pelvim ab Ischiadica non secessit non rarum est, eam extra Pelvim demum ab ea ortam fuisse.”—*Fascic. iv. p. 35.* See also *p. 30.*

the two at last generally meet, and form the arch already described. Sometimes one of the two is wanting; sometimes there are more than one on a side, when they are always smaller and of less extent, in proportion to their number. They sometimes inosculate with the last of the Lumbar; and not unfrequently send ramuli to the Glands lying *dorsad* of the Iliac Portion of the Crural.

Their origin is sometimes in the Pelvien Iliac, sometimes in one, and sometimes in another of its branches; but very rarely in the Lumbar Portion of the Crural Artery (*l*)

Arteriæ Uterinæ.

Flexuous branches ramified on the Uterus, and varying their size with the state of the organ, as it enlarges during impregnation, or as it contracts after parturition. Sometimes one, and sometimes more

(*l*) Haller, speaking of these branches, says, “A trunco
“vero Iliacæ ut J. B. Winslowo obtigit nondum ortas fuisse
“vidi.”—*Fascic. iv. p. 28.* The passage of Winslow, to which he refers, is in § 229, where, treating of the branches from the Lumbar Portion of the Crural Artery, he says, there are few of any note: “excepté quelques Arterioles qui vont à l’Os Sacrum,
“et dont quelques unes entrent par les Trous Supérieures de
“cet os, et s’y distribuent comme les Sacrées.”

on the same side, they extend their branches occasionally as far as the Vagina and Urinary bladder ; inosculate with their fellows of the opposite side, and with branches proceeding from the Spermaties.

Arteriæ Vesicales.

THE branches ramified on the Urinary bladder, are the remains of the two Umbilicals ; some branches from the Uterine Arteries, if in the female ; branches directly from the *Pelvien Iliac*, or from some of its branches ramified on the Rectum ; at times, small branches from the Epigastries reflected *sacrad* from the Umbilicus ; and not unfrequently a branch or two from the Obturatoria, extending to the Prostate and Vesiculæ Seminales (*g*).

Arteriæ Umbilicales.

IN the adult two small branches on each side of the Urinary bladder, and in different individuals of different extents of ramification. The directions of their trunks, is from the neck of the bladder to its Fundus. In the adult, they are properly Vesical ; but retain the title and rank of an office, which at one time they held in the Fœtus. At that period, they

(*m*) See *Haller*, *Fascic. iv. p. 38, 39*, and *Fascic. viii. p. 42*.

were among the principal Arteries of the system, essential to its nourishment, its circulation, its existence. They appeared then to be continuations of the two large trunks, into which the Aorta divides in the Loins; they ascended beyond the Fundus of the bladder to the Umbilicus, beyond the Umbilicus to the Placenta, and, without measuring their spiral windings around the large Vein of the Cord, were longer than the whole body itself. The Crural Arteries at that time, scarcely a fourth part of their size, appeared but as branches arising from their sides; while the *Pelvien Ilacs* were branches also, but inferior in size, arising from the convexities of their curve, where they turned by the side of the Urinary bladder *atlantad*, and *sternad* to the Umbilicus. The bladder itself was different too in point of situation; it was not then sunk into the Pelvis, as in the adult; and its Fundus reached to near the Umbilicus.

In one of my Vascular preparations of the Fœtus; which I owe to the kindness and politeness of a pupil, there is only one Umbilical Artery ascending on the Dorsal aspect of the bladder, and seemingly a continuation of the Aorta.

Arteriæ Hemorrhoidæ.

THESE are branches distributed to the Rectum, deriving a name from their situation, either at or near to the place where blood is discharged from Hæmorrhoidal tumours. A morbid appearance conferring here, like one near the Basilar aspect of the Tongue, an epithet of distinction on the neighbouring Arteries. They are very irregular in size, origin, number, and extent of ramification. They are seen springing from the *Pelvien Iliac*, the *Sacro-median*, the *Gluteal*, *Ischiadic*, the *Vesical*, *Vaginal*, and *Pudic* branches. Anatomists arrange them into *internal*, *middle*, and *external*, not with a reference to what is central or peripheral in the Rectum, but with a reference to its two extremities, and the space intervening. In this sense, the most internal are those which arise from the *Smaller Mesenteric*, and the most external those which arise from the *Pelvien-pudic*.

What Haller calls the *Middle Hæmorrhoidal*, is a branch which he not unfrequently saw running on that part of the Rectum where it meets the Vagina, or Urinary bladder; a branch extending its ramifications to the Urinary bladder, the Prostate Gland, the Levator Ani, the Sphincter Ani, and the Urethra; not regular in its origin, nor always present.

Pudica Pelviena (n).

A branch distributed to the Sexual organs, rises singly from the *Pelvien Iliac*, or along with some one of its branches, and often along with the Ischiadic, from which it is afterwards observed to separate, sometimes without, but more frequently within the Pelvis. If it separate without, the common trunk, or some other Artery, furnishes the branches which it usually gives to the parts within. If it separate within, it still accompanies the Ischiadic out of the Pelvis. What is peculiar and singular in its course, is, that it always returns into the Pelvis between the Sacro-ischiadic ligaments, attaches itself to the Mesial aspect of the Ischial Tuberosity, protected by a process of the larger ligament against any lateral pressure from the Rectum, continues this course close to the Ramus of the Ischium and Pubis, till it reaches the Symphysis, when it turns suddenly on the Dorsum of the Penis, stretching along it, under the Integuments, and parallel to its fellow, as

(n) This artery has been named simply Pudenda, sometimes Pudenda Communis, Pudenda Circumflexa, Pudenda Interna, Pudenda Media, Pudenda Externa ; I have here distinguished it by the epithet *Pelviena*, which, though rude and barbarous, implies a Pudic originating on the Pelvis, and serves to distinguish it from Pudic branches originating in the Groin.

far as the Glans, to which and the Prepuce, it is seen distributing its ultimate branches.

In every part of this long and circuitous course, it is sending branches to the parts adjacent; before it leaves the cavity of the Pelvis, it is often seen giving branches to the Rectum and Urinary bladder; not unfrequently to the Seminal Vesicles, the Prostate Gland, the Obturator Internus, and to the Vagina, if in the female.

From where it emerges to where it returns, it assists the Ischiadic either by increasing its usual resources, or supplying some occasional deficiencies. In common therefore with the Ischiadic, it sends branches to the Pyriformis, the Gluteus Magnus, the Coccyx, the Gemelli, the Ischial Tuberosity, the Biceps, Triceps, Semitendinosus, and Semimembranosus, where these are attached to it. If not sent by the Ischiadic, it transmits a branch along the Gemelli to the Trochanter, from whence extending its ramifications in the vicinity, it communicates with the Internal Circumflex and Obturatoria.

Having passed the ligaments, it sends additional branches to the Rectum, called External Hæmorrhoidals; branches to the Levator Ani, the Sphincter Ani, and the surrounding adipose substance. Running *sternad* and *atlantad*, close to the Ramî of the

Ischium and Pubis, along the side of the Perineum, it gives out branches to the neighbouring muscles, the Transversus Perinei, Acceleratores Urinæ, and the Erector ; branches to the Corpus Cavernosum Urethræ ; branches to the Scrotum, that ultimately inosculate with the Inguinal Pudics, with the Spermaties, with the Reflex branch accompanying the Cord from the Epigastric, and with their fellows of the opposite side ; a branch or branches to the Corpus Cavernosum Penis, running longitudinally, and near the axis, to the further extremity, filling the cells by numerous ramuli in the time of erection, and communicating through the Septum with similar ramuli from the opposite side.

In cases where this Artery is obstructed, originally deficient, or much exhausted by its previous branches, the Corpora Cavernosa, and the Dorsum of the Penis, receive a supply from neighbouring branches. Haller observed a Vesical branch from the Obturatoria passing under the Symphysis Pubis, and inosculating with the Pudic branches of the Penis (o). At other times, he saw a branch from the same Artery, covered by the Obturator Internus, passing under the Symphysis, inosculating with the Pudic

(o) *Fascic. iv. p. 32.*

branches of the Penis, and entering together the Corpora Cavernosa (*p*). Twice he saw the Obturatoria furnishing the Pudic branch of the Penis (*p*); a circumstance, he adds, observed by Lieutaud, and mentioned by Columbus, as the usual distribution(*q*). Besides these branches from the Obturatoria, other branches from different sources, running on the confines of the Rectum and the Bladder, have been seen emerging under the Symphysis, and running along the Dorsum of the Penis. A Vesical branch,

(*p*) *Fascic. iv. p. 32.*

(*q*) Haller, *Fascic. p. 32.* The language of Lieutaud alludes only to the branch running on the Dorsum of the Penis. “L'Artère, qui marche sur le dos de la verge; tiens assez souvent de l'Obturatrice.” See his description of the Obturatoria. The language of Columbus in the last page but one of Lib. vii. is exceedingly vague, and I think not correct; he describes the Pudic branches of the Penis, as rising regularly from the Obturatoria, after they have passed the Foramina Thyroidea. “Duæ vero aliæ (sc. Arteriæ) transeunt per Foramina sita in osse Pubis, coxendicisque, e quibus, quum primum abdomen ipsum egressæ sunt Arteriæ, mittuntur ad duo corpora Penis, quæ a summo ad imum feruntur, in iisque in ramos abeunt. Atque hæ illæ, illæ inquam sunt Arteriæ, quibus erectio mentulæ accepta ferenda est; quam rem nemo, quod sciam, nostris temporibus, neque ex antiquis cognovit, aut scripsit.” Haller, probably, in alluding to this passage of Columbus, had trusted to some reference in his note-book, that did not bring the full and precise import of its meaning to his recollection.

from what Haller calls the Middle Hemorrhoidal, is often continued along the Prostate into the Dorsal Artery of the Penis (*r*), the *Honteuse Externe* of Winslow, the principal branch of the Pudic Artery, and sometimes a branch of the *Pelvien Iliac* runs in the angle that is formed between the Bladder and the Rectum, distributes branches to the neck of the Bladder, to the Prostate Gland and Vesiculæ Seminales in the male, and at last emerging under the Symphysis, is the Artery of the Penis (*s*). The branch that accompanied the Ischi-

(*r*) See Haller, *Fascic. iv. p. 37.*

(*s*) “ Le second Rameau principal, appelé communément
 “ Artère Honteuse externe, se jette dans l’union de la Vessie
 “ et du Rectum, va dans l’homme aux Vesicules Seminales, au
 “ Col de la Vessie, aux Prostates, et aux parties voisines du
 “ Rectum.

“ Ensuite il passe sous l’Os Pubis, à côté d’une Veine con-
 “ siderable, qui est directement sous la Symphyse de cet Os, et
 “ coule le long du Penis, entre cette Veine et un Nerf, en se
 “ distribuant en chemin aux Corps Caverneux, et en communi-
 “ quant avec la Petite Honteuse qui vient de l’Artère Crurale.

“ Ce second Rameau de la grande Honteuse sort quelque-
 “ fois séparément de l’Hypogastrique, principalement dans le
 “ sexe, ou elle se distribue par plusieurs Ramifications aux
 “ côtés de l’Uterus, et communiquent avec les Artères Sper-
 “ matiques vers les Franges de la Trompe de Fallope, et aux
 “ parties voisines du Vagin,” &c. *Winslow, Traité des Ar-*
tères, § 249, 250, 251.

adic, was seen to terminate in branches to the Rectum, the Sphincter Ani, the bulb of the Urethra, the fat, the Integuments, the Corpora Cavernosa, and as we must suppose, from what he says afterwards, at the commencement of the Corpora Cavernosa. Nay, Haller has observed, that all the more ancient Anatomists describe the Pelvien-pudic as passing under the Symphysis Pubis, and along the Prostate (*l*); and Mr. Burns has seen it three times taking this course in the male subject (*u*).

The cases must be rare, and extremely rare, where the Artery of the Penis originates in one of the Pudics of the Groin. Haller had never seen an instance of the kind, and notwithstanding the testimony of C. Bauhin, J. Veslingius. G. Rolfink, T. Bartholin, Diemberbroeck, and Ravius, could not easily believe that such an instance ever had occurred (*x*).

With regard to their assertions, I must confess that I feel not so sceptically inclined as he. The Pudics from the Groin are in the vicinity, and have

(*l*) Haller, *Fascic. iv. p. 37.*

(*u*) Burns' *Varieties of the Larger Arteries.*

(*x*) "Arteriam vero Penis (aut clitoridis) a Pudenda externa
venisse ut plurimi scriptores habent.—Id omnino nun-
quam vidi, neque facile credam visum fuisse."—*Fascic. iv.*
p. 37.

long been known to inosculate directly or indirectly with the Pelvien-pudic. Haller had observed the Obturatoria, and other vessels from under the Symphysis, supplying the Penis. Supposing such vessels might happen to be wanting, or be casually obstructed, would not some of the other vessels adjacent naturally succeed in performing the office; and did he not afterwards himself observe, an Inguinal Pudic extending a branch along the Penis as far as the Prepuce (*y*)? There is not an Artery perhaps in the body, from which the blood has not access to every other Artery, and to every other part, however distant, without passing through the Aorta. I make not this remark to inspire any immoderate confidence in such communications, when Arteries are tied in cases of Aneurism; the number and the size of inosculating branches, and the distance to which the blood is to be carried through the lateral channels, must, in these circumstances, be all taken into due consideration. The cases where one of the Encephalics (*z*), the Inguinal Portion of a Crural Artery (*a*), and a part of the Aorta beyond the Arch (*b*), have been found obliterated, are well cal-

(*y*) *Fascic. v. p. 9. col. 2.*

(*z*) *Note, p 59.*

(*a*) *Scarpa on Aneurism, ch. x. § 13.*

(*b*) *Ibid, chap. iv. § 9.*

culated to inspire such hopes, while to a mind that is eager and sanguine in its expectations, it will naturally occur, that there are many thousands of vessels scarcely visible to the naked eye, that do not enter into any description, that meet by innumerable inosculations, and that often refuse to admit our injections, although they freely circulate blood in the living body. Were these Arteries only to enlarge, and to open new channels for that blood which flowed in the trunks, as they have frequently been found to do, where trunks have been obliterated, contracted, or obstructed, why might not any of the large Arteries be tied in Aneurism, without hesitation and without apprehension? That the lateral vessels, in such cases, have often been enlarged, and been found adequate to perform the duty of the larger vessels, cannot be denied.

But an object of some importance to Surgery, and the reader will here pardon the digression, would be, to ascertain in what periods the gradual enlargement of the lateral vessels in different situations may be accomplished. The instances of persons who have had obliterations of the larger Arteries, do not warrant us suddenly to tie these vessels in an operation. When the whole process is committed to Nature, the larger vessels may con-

tract only in proportion as the smaller branches enlarge; for the change has often taken place insensibly. We are not therefore merely to consider the extent of the change, but the time and manner in which the change may be effected. Nature may provide against a disease that approaches gradually, and sink under one of inferior violence that attacks by surprise; and hence we have often occasion to see that it is not always the extent of an injury, but often the suddenness with which it is inflicted, that proves fatal.

In varying the ramifications of Arteries, to preserve entire the functions of the system, we know in general, that nature is prompter in one species of animal than in another, in the young, than in the old, in the healthy and vigorous, than in the sickly and feeble. But a precise knowledge of her powers, and her modes of proceeding in these operations, is still to be acquired. At the same time it must be confessed, that we have obtained much information on this subject from those cases, where, in order to prevent the evils of Aneurism, the Cephalic Artery, the Axillary Portion of the Brachial Artery, and the Iliac Portion of the Crural Artery, have been tied with success, and without any means previously employed to enlarge the channels that were to succeed in performing their duties.

In these cases, the events have shown what the accommodating power of the system in certain parts, in certain states of the constitution, and during certain periods of life, has been able to accomplish: What it may do in different parts, in different states of the constitution, and in more advanced periods of life, remains still to be a subject of inquiry. In declining years, or declining strength, its efforts are but feeble; while in those instances, where it has been able to provide a remedy against the obstructions of the larger Arteries, it seems to have done it by previously and gradually enlarging the vessels that were in future to perform the functions. This is not exactly the method that is followed when we hastily proceed to tie an Artery, without a previous attention to the channels in which its blood is afterwards to flow. A limb may be lost, and I venture to say many have been lost, where the accommodating power of the system, from want of ability, or from want of time, could not possibly provide against the effects of sudden obstruction.

An imitation of the natural process, by previously compressing the trunk of the Artery, and gradually enlarging the lateral vessels, before the operation of tying the ligature, has frequently been attended with obvious advantage. As to the circumstances which

ought to regulate the extent and continuance of this compression; where it is practicable and where not; when and where it would be injurious; and when alone it would be capable of performing a cure without the necessity of an operation, the reader will receive much information from Scarpa's valuable treatise on Aneurisms, and from the notes of his ingenious and accurate translator Mr. Wishart.

We know not yet the causes which produce, and the causes which prevent the total obliteration of the Artery, and its several branches between the ligature and Aneurismal Sac; and know still less how far the obliteration extends, when an Artery is tied on account of an Aneurism in one of its branches.

The success of tying the Subclavian Portion of the Brachial Artery, has not hitherto proved very encouraging. No other Artery that has yet been tied, is so near to the Heart, or in the neighbourhood of such a number of important organs, as the Par Vagum, the Great Intercostal, the Descendens Noni, the Axillary Plexus, the Subclavian Vein, the Internal Jugular, and Cava Superior; no other Artery that has yet been tied, gives out, in so small an extent of space, such a number of large and important branches, or so irregular as to the precise point of their origin; no other Artery that has yet been tied, is so little susceptible of being raised from its situa-

tion; and no other that has yet been tied, is found in a direction so different from the muscles by which it is covered, or in a situation where the incision can be less extended, or the operation more apt to be impeded by the motions of such a bone as the Clavicle. In the dead body, this hinderance, arising from the Clavicle, and its muscles, may be easily removed, and without any chance of recurring. In the living body, where the incision must always be long in proportion to its depth, the remote consequences of the operation are as much to be dreaded, and perhaps more, than the immediate effects of the knife, if in the hands of a dexterous Surgeon.

It is customary, in cases where operations turn out fatally, to make the Surgeon responsible only for the immediate, and Nature for all the remoter consequences. The practice, however, is founded neither in justice nor candour. It is fortunate when the Surgeon is able to prove, that, had she been entirely left to herself, the event might have proved equally adverse. She cannot be held responsible for consequences immediate or remote, that arise entirely from a situation into which she is driven by compulsory force, and in which she is obliged to act from necessity.

Mr. Cooper of Guy's Hospital, to whom Surgery has been much indebted, has, with a view to illus-

trate farther the effects of ligature upon large Arteries, made a number of new and very interesting experiments on dogs ; and, in some of these, tied the Abdominal part of the Aorta, and shown that its functions may be performed by communicating branches, and the trunk obliterated only to a small distance from the ligature (c). He had also a view, in these experiments, to ascertain, whether or not, in tying a number of the larger Arteries, and making their blood to flow through numerous and minute branches, he could affect the habits of the animal, and render them somewhat similar to those of the Lemur Tardigradus, and other animals of slow motion, in which Mr. Carlisle had regularly observed the blood of the extremities circulating through numerous and minute vessels. But such an effect could have been expected, only at the time when the lateral vessels were imperfectly performing their new kind of duty, not after they were capable of furnishing the parts with as liberal a supply as they had been accustomed to receive from the trunk.

Whatever it be that organizes the animal or vegetable, it appears always to operate on a plan prescribed to its species, and, with change of circumstances, has always a power of more or less limited extent, to modify its organs, for the regular exercise

(c) *Medico-Chirurgical Transactions for 1812.*

of those functions that characterise and distinguish its species. Had the minute divisions of the Arteries, observed by Mr. Carlisle, been destroyed by ligature, and new Arteries succeeded to the office, it is reasonable to infer, on the principles of analogy, that the new Arteries would have performed the same kind of duty that had been performed by the original ramifications.

I have always considered these observations of Mr. Carlisle on slow moving animals, and Willis's remarks on the Rete Mirabile, as highly important. They direct the attention of the Anatomist to a series of relations that have been overlooked; but which might reflect considerable light upon Physiology, if carefully traced, on the principles of induction, through the various genera and species of animals.*

ARTERIA CRURALIS,

Iliac Portion,

ILIACA EXTERNA, or CRURI ILIACA.

THIS Portion of the Crural Artery is found on the Mesial aspect of the Psoæ, on the Lateral aspect of

* See *Philosophical Transactions*, pt. 1. 1800, and pt. 1. 1804.

the Crural Vein ; occasionally gives out a few Ramuli to these muscles, the coats of the Vein, and the neighbouring Glands ; but seldom any branches of note, till near its termination at the Crural Arch. At that place, resting on the Psoas and Iliacus Internus where these are united, the Crural Vein situated *mesiad*, the Nerve *laterad*, and each surrounded, as well as the Absorbents in their vicinity, with a somewhat more than usual proportion of Cellular membrane (*d*), it sends off, as its regular branches, the *Epigastric* and *Circumflex Iliac* ; as occasional branches, the *Obturatoria* and *Profunda Femoris*, but the last very seldom.

ARTERIA EPIGASTRICA.

RISES *peripherad* of the Peritoneum, and *mesiad* and *dorsad* of that orifice where the *Spermatic* enters the Parietes ; ascends from its origin *atlantad* and *mesiad*, at first between the Peritoneum and Transversus Abdominis, then between the Peritoneum and Rectus Abdominis, and lastly between

(*d*) “ Multa hic ubique et longa cellulositas Arteriam, venam
 “ nervosque sodales irretit.”—Haller, *Fascic. v. p. 8*. “ Truncus
 “ femoralis pergit per Iliacum incedere, irretitus plurima duri-
 “ useula cellulositate.”—*Ibid. p. 10*.

the Rectus and its Sheath, advancing onward till it reaches the region called *Epigastric*.

At its commencement, it sometimes descends before it ascends (*e*), and as it is regularly giving out branches during its course, it often affords small branches to the Inguinal Glands ; regularly branches running *mesiad* towards the Symphysis, spreading on the parts in the vicinity, and sometimes extending to the Urinary Bladder. Among these, a branch or branches to the round ligament, or Spermatic Cord. The branch to the ligament is sometimes partly reflected on the Uterus ; the branch to the cord, distributed partly to the Cremaster, to the parts near the Symphysis Pubis, to the Scrotum, Dartos, sometimes to the Tunica Vaginalis and Testis, and always inosculates with the Spermatic, and with some of the Pudics. As it advances, it continues to give out other branches from its Mesial aspect, that inosculate with their fellows of the opposite side, near the Linea Alba ; numerous branches from its Lateral aspect, that inosculate with branches from the Circumflex Iliac, the Ilio-lumbar, and, when farther advanced, with branches from the Lum-

(*e*) “ Media nonnunquam inter duas socias venas descendit prius, quam ascendat.”—Haller, *Fascic. v. p. 8.* See also Burns’ *Varieties of the Larger Arteries*.

bars. Among the branches from its Mesial aspect, is one so large, that Haller and Murray describe it as the trunk (*f*). This branch ascends *atlantad* and *mesiad* to the Umbilicus, where it meets with a branch from the Sternal Artery, and inosculates with its fellow of the opposite side ; from the place of their meeting, they send branches to the Umbilical cord, some accompanying the Vein to the Liver, and inosculating with other branches from the Sternal on the broad ligament ; some descending along the Arteries towards the Bladder, and communicating with branches from the Vesicals. What appears in general the trunk, ascends more directly near to the lateral edge of the Rectus on its central aspect, distributing, in its course, branches to the Rectus, the Transversus Abdominis, and Obliquus Internus, inosculating freely under the Rectus with a lateral division of the Sternal Artery, by lateral branches with most of the Lumbar, and by branches that ascend with two or three of the last Intercostals.

As to the precise point of its origin, it is sometimes higher, and sometimes lower in the Iliac Portion of the Crural Artery ; sometimes it rises by a common

(*f*) *Haller, Fascic. v. p. 8.* The description here is adopted by Murray, but does not correspond with the figure which Haller has afterwards given in his sixth Fasciculus, Tab. 1.

trunk with the Obturatoria; sometimes again by a common trunk with the Circumflex Iliac (g). Mr. Burns has seen it taking its origin from the common Femoral Artery, and from the Superficial Femoral Artery (h). Dr. Monro from the Deep Femoral, and from the Femoral along with one of the External Pudics (i).

By the Epigastric taking its origin from the Iliac Portion of the Crural Artery, and meeting the Sternal from the Subclavian Portion of the Brachial, an additional communication is formed between the branches of the Atlantal and Sacral extremities. By this communication, there is also a kind of peculiar communication between the Sexual organs and the Mammæ, by which Physiologists have endeavoured to explain their mutual sympathies. From these pairs of Arteries running near to the Mesial Plane, on the Sternal aspect, and from the Aorta distributing its branches from the Mesial Plane at the Dor-

(g) *Morbid Anatomy* by Dr. Monro, Jun. p. 426.

(h) *Burns' Varieties of the Larger Arteries*.

(i) Dr. Monro, Jun. has requested me here to correct the error that has crept into his work, where it is said, p. 426, that the Epigastric sometimes arises from the Pudic Artery.

In dried preparations of the Sacral extremities, where the Arteries are retracted, the Epigastric generally appears to arise beyond the ligament of Poupart in the region of the Groin, representing that species of variety where it originates in the Common Femoral.

sal aspect, the sides are supplied from opposite sources, and therefore when a part of the Aorta is obstructed, or is quite obliterated, these Arteries are ready, with other communicating branches on the sides, to assist the Aorta, and supply its deficiencies.

ILIACA CIRCUMFLEXA,

or,

Abdominalis Halleri,

RISES sometimes opposite to the Epigastric, generally after it, commonly near it, and sometimes along with it by a common trunk; it proceeds from this origin *atlantad* and *laterad*, to turn round by the crest of the Ilium on the central aspect; near to the highest of the two Anterior Spinous Processes; it passes through the Transversus Abdominis, and between that and the Obliquus Internus, continues, to follow the curvature of the crest, until it arrive at its highest point, when it stretches more directly *atlantad*, to inosculate with branches of the Sternal Artery, and with some branches from the last Intercostals.

The branches it gives off in the progress of its course, are small branchies to the Inguinal Glands;

sometimes a branch, or sometimes branches, spreading towards the Symphysis Pubis, the Cremaster muscle, and Spermatic Cord. The branch to the Cord occasionally descending to the Tunica Vaginalis, and inosculating with branches from the Pudic and Spermatic; branches to the Psoas and Iliacus Internus, and a large branch winding round by the circumference of the Iliacus, till it meet and inosculate with a branch proceeding from the Iliolumbar; branches ascending *atlantad* and *mesiad*, to meet with branches from the Epigastric; and other branches ascending *atlantad* and *laterad*, to meet with branches from the Gluteal and the Lumbar Arteries.

The proportional magnitudes between some of the larger branches of this Artery, are subject to varieties. Hence sometimes one, and sometimes another may appear to be the trunk. Among the branches that run *mesiad* to inosculate with branches from the Epigastric, Mr. Burns has seen one extending in a line between the highest of the two Anterior Spinous Processes and the Umbilicus; and of such a size, as almost to annihilate the other branch that accompanies the crest of the Os Ilium. This branch, he observes, would certainly be in danger in performing what is called Paracentesis, be-

tween the Umbilicus and the highest Anterior Spine of the Ilium.

The trunk itself is subject to varieties in proportional magnitude. I write at present from verbal report, and from the authority of what I conceived an accurate drawing by the gentleman who observed it. In that drawing, the Artery, between the Crest and the Ribs, was nearly as large as it is usually at its commencement.

Sometimes, too, this Artery is assisted by another Branch, either from the Femoral, or deep Femoral, observing nearly a similar course, and very nearly of similar extent, but running superficially beneath the Integuments (*k*).

ARTERIA OBTURATORIA.

THIS Artery, accompanied by the Nerve called Obturator, passes through the Foramen Thyroideum in the Sinuous notch of the Os Pubis. Be-

(*k*) “ Paulo post hanc Abdominalem, ex Femorali alia frequens Arteria ad cutem exteriorem Abdominis per latus super spinam Ilium ad imas fere costas ascendens, nascitur, quæ et ipsa Glandulis Inguinalibus dat, et versus pubem ramum. Vidi ex Profunda Femoris hunc ramum ortum fuisse.”
—Haller, *Tab. 1. Fascic. iv. and Fascic. v. p. 9.*

fore it emerges from the cavity of the Pelvis, it distributes branches to the Obturator Internus, not unfrequently to the Urinary Bladder and the Prostate Gland, and, in rare cases, sends off one of the Arteries of the Penis (*l*). After leaving the Pelvis, it branches on the Obturator Externus, on the heads of the Triceps, Quadratus Femoris, the Capsular Ligament, the Acetabulum, sometimes within it, and near the Tuberosity of the Os Ischium. From its situation, it falls to inosculate with the Pelvien Pudic; and if it sends branches to the Pectineus, or gives off one of the Arteries of the Penis, with the Inguinal Pudics; near the Ischial Tuberosity, it communicates with branches from the Ischiadic; and near the Acetabulum and Capsular Ligament, with branches from the Internal Circumflex.

With regard to its origin, it is singularly irregular. It has been observed arising from the trunk of the PELVIEN ILIAC, from the Gluteal, the Ischiadic, the Pelvien Pudic, and from the Iliac Portion of the Crural Artery. Nine times Haller observed it arising by a trunk common to it and the Epigastric; while others have remarked, that the common trunk being sometimes longer and sometimes shorter,

(*l*) See Haller, *Fascic. iv. p. 32*, and *Fascic. viii. p. 42*.

makes it to assume different situations, with respect to the sac in Crural Hernia. Mr. Burns saw it twice deriving its origin from the Superficial Femoral, and ascending to the Pelvis under the Arch, and along the Mesial aspect of the Vein. Haller saw it composed of a branch from the PELVIEN ILIAC, and of another from the Epigastric, and expresses his surprise that the like had been noticed by Jacobus Sylvius, at a time when minute Anatomical Description was not very common. Portal has observed these two branches uniting into one before they left the Pelvis, and has seen them inosculating only by their branches after they left it (*m*).

In Crural Hernia, the Obturatoria from the Epigastric has been seen running round the neck of the sac on the Sternal aspect. Dr. Monro, when he lately published on Morbid Anatomy, imagined this circumstance had first been noticed by Mr. James Wardrop. In Britain, I believe, it was first noticed in that preparation of which Dr. Sanders has, in his Thesis, and Mr. Cooper, in the second part of his work upon Herniae, given a figure. The preparation was made from a subject which I had been demonstrating publicly in my Class ; was injected and

(*m*) See his description of the Epigastric.

dissected by my then assistant, Mr. John Dickson, now a surgeon in the Royal Navy. Mr. Cooper, with a laudable attention to accuracy, declined to publish an account of it from a drawing, and accordingly the preparation was sent to him at the request of my friend Mr. Wardrop.

As the origin and course of the Obturatoria, and Internal Circumflex, with relation to the sac in Crural Hernia, and of the Epigastric, in relation to the sac in both the Inguinal and Crural Herniae, can never be very precisely ascertained previous to actual examination(*n*), the only general rule to be given for avoiding these branches in the operation, is, when near the situations where they have been (*o*), or possibly may be, to examine every part before it is divided, and to divide none that has not been examined with the utmost attention. The eyes of the dumb, when properly instructed, can, in one sense, distinguish the sounds of a language readily, by seeing at the time the organs which articulate them; and the fingers of the blind, with proper attention, can be taught not only to write with facility, but, if I may

(*n*) The Internal Circumflex sometimes rises within the Pelvis. See *Burns' Varieties of the Larger Arteries*.

(*o*) Most of these situations are enumerated in the excellent works of Cooper and of Lawrence upon Herniae.

venture on such an expression, to read what is written (*p.*) Without a *Visus* and *Tactus Eruditus*, a sight and a touch, grown quick in discernment from habit and experience, without an accurate knowledge of the structure, a head that reflects, and a hand that can execute with promptness and precision, surgery has very little to expect from new contrivances in the modes of operation, or from new inventions in the way of instruments. An instrument of the least fashionable form, in the hands of such men as a Cheselden or a Hunter, is more to be trusted, than one of the newest and most elegant invention in the hands of a person who can merely talk of it, but has not the head or hands to apply it.

ARTERIA CRURALIS,

Inguinal Portion,

FEMORALIS COMMUNIS, *or* CRURI-INGUINALIS.

NOR Haller, nor Lieutaud, nor Sabatier, nor Soemmerring, nor Boyer, nor Portal, nor the Continuator of Bichât, have acknowledged this division of the Crural Artery. It commences nearly under

(*p.*) “ *Essai sur l'éducation des aveugles. Par M. Haüy.*”
An Essay that was printed, and read by the blind. Paris 1786.

the middle of the Ligament of Poupart, measuring from the Symphysis, to the highest Anterior Spine of the Ilium (*q*) ; runs *centrad* of the Fascia and Inguinal Glands, is surrounded by much adipose substance, and unusually strong cellular membrane ; has the crural nerve and Iliacus Internus situated *lateral*, the Pectineus and the Vein *mesiad*. Murray has called it the *Common Femoral*, and makes it to send off the Inguinal Pudics, and to terminate at the origin of the deep Femoral. The termination is the only thing doubtful. The question occurs, where does the deep Femoral originate ? In one preparation in my possession, and where there was no retraction of the vessels, it rises where the trunk of the Crural Artery sinks under the Sartorius, and by actual measurement at more than the distance of two inches beyond the origin of the Circumflex Arteries, which rise together by a common trunk from the Crural Artery. Haller has seen it taking its origin, *in imo Iliaco Interno*, at the lowest part of the Iliacus, or at its insertion in the Trochanter Minor ; he has seen it rising, *medio loco fere*,

(*q*) “ Au milieu de l'espace compris entre l'Épine antérieure supérieure de l'os des îles et la Symphyse du Pubis.” — *Boyer*.

at nearly an equal distance from the Trochanter Minor and Pubis; and has seen it rising before any of the Inguinal Pudics, *in summo fere Iliaco*, at nearly the highest part of the Iliacus^(r). If he means the most elevated part of the Iliacus, or the part at the greatest perpendicular distance from the table or ground, when the subject lay supine, it rose from the Crural a little *atlantal* of the Ligament of Poupert; and within the Pelvis; if he means the most Atlantal part of the Iliacus, which I think he does not, it rose near to the PELVIEN ILIAC. Mr. Burns, at the time that he published his *Varieties of the Larger Arteries*, had seen it, in three different subjects, springing from the Cruri-Iliac within the Pelvis.

(r) “In imo Iliaco Interno nascitur plerumque *Profunda* Femoris quæ frequentius Circumflexam internam et externam generat.”—*Haller, Fascic. V. p. 10.* In another part of the same column, he says: “Nascitur *Profunda* in musculo Iliaco, quem ad finem sequitur, medio loco fere orta inter Os Pubis et Trochanterem minorem;” but this last passage has no reference to the general or common origin of the Artery; only to its origin in particular cases as represented in the first and second plate of his fifth Fasciculus, and in the front view of the whole body, in his eighth Fasciculus. From not attending to these references, Boyer was misled where he says: “Elle (l’Artère Profonde) naît de la partie postérieure et un peu externe de cette Artère, (la Crurale) vis-à-vis le milieu de l’espace compris entre le Pubis et le petit trochanter, quelquefois plus haut, mais rarement plus bas.”

In short, this Artery rises sometimes *proximal*, and sometimes *distal* of the Inguinal Pudics and the Circumflex Arteries; sometimes it gives off an Inguinal Pudic, sometimes the Epigastric itself (*s*), sometimes one, and sometimes both of the Circumflex Arteries; when it gives one, the other arises sometimes before it, and sometimes after it from the Crural trunk.

If the Surgeon, in order to guide his operations, should be anxious to know in what proportional number of times does the one or the other of these distributions happen to occur, the answer, supposing that it could be given on the broad and genuine principles of induction, would be of little service in practice; can it be imagined that any would ever be so thoughtless and rash, as to think of operating by such a rule: first, a certain number of times proportioned to the frequency of this distribution, and then, a certain number of times proportioned to the frequency of that distribution. The most common variety is where the Profunda rises nearly opposite the Trochanter Minor, and gives off the two Circumflex Arteries; the Inguinal Pudics arising previously between that origin and the Liga-

(*s*) See p. 232 of this Treatise.

ment of Poupart. But however numerous the varieties may be, they present nothing that appears peculiarly characteristic. It seems to be a general law of the system, that where a trunk like the Pericephalic, the Subclavian Portion of the Brachial Artery, or the PELVIEN ILIAC, is to supply a number of parts, and, from nearly the same place in its course, it may either send off its branches separately, or two or more of them differently combined in a common stem; that where the size of these branches is small, it may send them off in the greater numbers; or in smaller numbers, if they happen to be large; and lastly, that branches, after they each take a separate course, may vary their size, their number of divisions, and their extent of ramification, as the neighbouring Arteries, to the same parts, furnish a greater or a less share of the general supply.

Without, therefore, attempting to define what nature herself has not chosen to define, the precise termination of the Inguinal Portion of the Crural Artery, I shall proceed to give some idea of those branches that usually originate directly, or indirectly, from the Crural Artery in that space interposed between the Ligament of Poupart, and where, in its progress, it approaches nearest the Trochanter Minor. Some of these may be termed simply *In-*

guinal branches, of no determinate number or size, of course, or extent of ramification; others may be named *Inguinal Pudics*, from their being ramified on the Sexual organs; two are the *Circumflex Arteries of the Femur*, and, though seldom the last, yet always the largest, is the *Femoral Profunda*.

RAMI INGUINALES (t)

INCLUDE a number of irregular branches, generally small, that are seen occasionally arising from the trunk, distinct from the Pudic and Circumflex branches. Some are ramified on the Inguinal Glands, some on the Psoas, Iliacus Internus, and the Pectineus, where they inosculate with Circumflex branches; some ascend over the Ligament, to be more or less extensively ramified under the Integuments of the Abdomen (u); some have extended *atlantad*

(t) See *Haller, Fascic. V. p. 10.*

(u) “ L’Artère Crurale fournit d’abord une ou deux petites branches que remonte sur le ventre entre le Peau et les Muscles, en communiquant avec quelques-uns des Rameaux de la petite Iliacque Antérieure et de l’Epigastrique, et quelquefois supérieurement à la hauteur de l’ombilic avec les Rameaux des Artères Mammaires Internes et des Thoraciques Antérieures: des Anatomistes les ont designées sous le nom d’Artères *Epigastriques Externes*.”—*Portal*.

and *laterad* to the crest of the Ilium, the Tensor Vaginæ, to the Sartorius, and Gluteus Medius, where they inosculated with Gluteal branches; some have been distributed on a part of the Rectus and the Sartorius, sometimes on part of the neighbouring muscles; some have accompanied the Crural nerve a part of its way; sometimes two or more of them have sprung from a common stem; and sometimes their places have been supplied by the neighbouring Arteries.

PUDICÆ INGUINALES.

I HAVE chosen this name to distinguish them from the Pudic that originates in the Pelvis. They are ramified on the parts that cover the Symphysis, on the Scrotum in males, on the Labia in females; some have been seen extending their branches on the Dorsum of the Penis as far as the Prepuce. They inosculate with branches of the Pelvic Pudic, of the Obturatoria, and of the Spermatic; and also with branches reflected on the cord from the Epigastric. The nearest in origin to the Ligament of Poupart, arise either from the Crural Artery, or from the Profunda, the more distal from the Crural Artery beyond the Profunda. Some mention three, a Superior, Middle, and an Inferior; but their num-

ber is not definite, nor is their extent of ramification; and when two of them arise by a common stem, they are counted as one.

CIRCUMFLEXÆ FEMORIS.

THESE branches are two, distinguished by the epithets *Internal* and *External*: the first penetrates deep among the muscles, and passes round by the Tibial aspect to the Popliteal; the second has received the title of *Circumflex*, merely from a branch that runs across on the Rotular aspect towards the Fibular; the first is ramified principally upon the adductors of the Femur, and the Flexors of the Leg that rise from the Pelvis; the second upon the abductors of the Femur, and Extensors of the Leg. Were I to substitute new epithets for *Interna* and *Externa*, I would propose *Major* and *Minor*, two relative terms that are strictly applicable, and not liable to any ambiguity.

CIRCUMFLEXA MAJOR,

seu

Circumflexa Interna,

IN a rare case, has been seen rising from the Cruri-Iliac within the Pelvis (x); often in the Groin

(x) See Burns' *Varieties of the Larger Arteries*.

above the Profunda, and sometimes by a common trunk, with the External or Smaller Circumflex; but most generally from the Profunda. Its course is *popliteal*, close to the Iliacus Internus and Psoas, and between the Acetabulum and Trochanter Minor, where it divides into several branches, one continued between the Adductor Magnus and Quadratus, and then reflected under the Quadratus towards the Gemelli. Between its origin, and this extent of its ramification, branches are distributed to the parts adjacent, to the Psoas, Iliacus Internus, and Pectineus, to the Scrotum in males, to the Labia in females, to the heads of the Triceps, (*y*), the Obturator Externus, the Capsule of the joint, to the Acetabulum, the Trochanter Major, and Tuberosity of the Ischium, to the Semi-tendinosus, the Semi-membranosus, and to the long head of the Biceps.

Towards the Scrotum, it inosculates with the Pudics; near the Acetabulum, upon the Obturator, and heads of the Triceps, with the Obturatoria; near the Ramus of the Ischium, with transverse branches from the Hæmorrhoidals; near the Quadratus and the Gemelli, with branches proceeding from the Gluteal, the Ischiadic, and the Pelvien Pudic; near the Trochanter, with perforating branch-

(*y*) The Adductor Brevis, Longus, and Magnus, when viewed as one muscle, are named the *Triceps Adductor Femoris*.

es from the Profunda, and with other branches from the Profunda on the Semi-tendinosus, the Semi-membranosus, upon the long head of the Biceps, and the heads of the Triceps.

CIRCUMFLEXA MINOR,

sen

Circumflexa Externa,

RISING sometimes *proximad*, and sometimes *distad* of the Profunda, but more generally from the Profunda, takes a transverse direction on the Rotular aspect, *peripherad* of the Psoas and Iliacus Internus, and *centrad* of the Sartorius and Rectus; at the Rectus, descends on the Central aspect of that muscle, near its Fibular margin, and is seen terminating in the Vastus Externus, not far from the Rotula. From its origin to the Rectus, it distributes Ramuli to the Iliacus, some *atlantad* into the Pelvis, and some *distad* to the Lesser Trochanter, where they inosculate with similar Ramuli from the other Circumflex. Arriving at the Rectus, it distributes branches to that muscle, and sends off the large transverse branch from which the whole has been named Circumflex. The Transverse branch passes *fibulad* under the Tensor Vaginæ Femoris, and generally under the Vastus Externus; distributing

branches in the space between the crest of the Ilium and the Trochanter, to the Iliacus, the Rectus, Sartorius, and the Tensor Vaginæ; to the Gluteus Medius; sometimes to the Gluteus Parvus and Magnus; and beyond the Trochanter to the Vastus Externus. On the Glutei, it inosculates with branches from the Gluteal; near the Trochanter, with extreme branches from the Larger Circumflex, and with perforating branches from the Profunda. To the Transverse branch follows a series of smaller branches running *distad* and *fibulad* to the Vastus Externus; the last inosculating with Articular branches near the Patella, and the preceding, by minuter Ramuli, with Circumflex branches from the Profunda.

When this, which is called the Transverse branch, is found to be a large division of the Trunk, the Trunk is named the descending branch. In rare cases, this Transverse branch arises from the Crural with the Larger Circumflex, while what is here denominated the Trunk, arises at a distance from the Profunda.

PROFUNDA FEMORIS,

VERY seldom rises within the Pelvis, often gives off one or both of the Circumflex Arteries, sometimes

a Pudic, very seldom the Epigastric, or a branch reflected towards the Abdomen. It is found of different proportional lengths, as it originates *proximal* or *distal* in the region of the Femur, and likewise of different proportional diameters, as it gives off more or fewer than the ordinary branches. From whatever part of the Crural it arises, it runs *distal* and *popliteal* towards the part of the Linea Aspera, where the Adductor Brevis is inserted, and where part of the Vastus Internus originates. Soon after, and generally at the Interstice between the Adductor Brevis and Longus, though sometimes later, and sometimes earlier, it crosses obliquely the Linea Aspera, and is seen distributing its ultimate branches to the Flexor muscles that constitute the Hamstrings.

In the progress of its course, it sends branches to the Vastus Internus, that occasionally extend to the Crureus ; branches to the Triceps, and one or more perforating branches, which, like the continuation of the Trunk, that is often described as the last of its branches, cross obliquely the Linea Aspera to the Semi-membranosus, the Semi-tendinosus, and the Biceps Cruris. These branches send off others of considerable size which, as Circumflex branches, turn round close to the Femur from the Popliteal to the

Fibular aspect, where they are ramified on the Vastus Externus, or the Vastus Externus and Gluteus Magnus. The perforating branches, whatever be their number, are not unlike either in their course, or their general distribution to the Larger Circumflex; the first, which crosses the Linea Aspera, near the insertion of the Pectineus, inosculates in its course with branches of the Circumflex; inosculates also with Ischiadic and Gluteal branches; while the second in succession, if there be a second exclusive of the Trunk, inosculates with branches arising from the first, as the Trunk inosculates with the perforating branch that immediately precedes it. Their Circumflex ramuli, which turn round close to the Femur, can be traced through their course only by removing the Vastus Externus.

ARTERIA CRURALIS,

Femoral Portion,

ARTERIA FEMORALIS SUPERFICIALIS, or CRURI FEMORALIS,

EXTENDS from the Groin *poplitead* and *distad*, at first, under the Integuments and Fascia, then,

under the Integuments, Fascia, and Sartorius, and lastly, under these and that Aponeurosis, which stretches *popliteal* from the Vastus Internus to the Large Adductor (*y*). Like the Profunda, but situated more to the Rotular aspect, it runs *distad* between the Vastus Internus and Triceps, stretches beyond the farthest insertion of the Long Adductor, and passes obliquely towards the Ham through the Large Adductor, where the Tendon of that muscle begins to give origin to the Distal part of the Vastus Internus.

Those Anatomists, who make it to commence always at the origin of the Profunda, will find it not unfrequently sending branches to the Inguinal Glands, affording an origin to the Smaller Circumflex, to one of the Pudics, and, in very rare cases, to the Epigastric. In its course, it sends branches to the Vastus Internus, the Gracilis, the Sartorius, and neighbouring Integuments. Near to the place where it perforates the Adductor, it gives off a branch called the *Anastomotie*, running *distad* and *rotulad* towards the Patella, and spreading out branches on

(*y*) Dans le reste de son étendue, il est couvert par le Peau, “ l’aponeurose *Fascia lata*, et le muscle Couturier; et de plus “ inférieurement par l’aponeurose qui va du vaste interne au “ troisième adducteur,”—*Boyer*.

the Tibial aspect, and across the Joint where they are expended upon the neighbouring Ligaments and Tendons, and the Fascia of the Leg.

Near the same place, sends off also one or more branches that are styled *Perforants*, running *distad* and *fibulad* across the Poples towards the Biceps and the Vastus Externus, these succeed to the perforating branches of the Profunda, and, like them, give out Circumflex ramuli that turn round close to the Femur under the Vastus.

ARTERIA CRURALIS,

Popliteal Portion,

ARTERIA POPLITEA, or CRURI POPLITEA,

RUNS first *distad* and *fibulad*, and then *distad* between the two Condyles of the Femur ; stretches as far as the Distal margin of the Popliteus, having this muscle and the Capsular Ligament situated *centrad*, the Tendons of the muscles forming the Hamstrings upon the sides, and covered *poplitead* by the Integuments, a large quantity of adipose substance, the Vein, and the Nerve ; and, lastly, after passing the Joint, by the Integuments, and the Belly of the Gastrocnemius Externus.

In this course, it sends off from its Lateral aspects branches distributed to the Flexor muscles on each side, and circumflected close to the Bone, under them and the Vasti. The last of these Circumflex branches *proximad* of the Knee, are named the *Superior Articular branches*, and two others *distad* of the Knee, the *Inferior Articular*. To these, if we add an *Azygos Articular*, *Two Branches* entering the Gastrocnemius Externus, and the *Two Large Cnemial Arteries*, into which it divides beyond the Popliteus, we enumerate all the usual branches ascribed by Anatomists to this portion of the Crural Artery.

PROXIMO-ARTICULARES,

OR

Articulares Superiores Externa et Interna.

THE two Superior or Proximo-Articulars, circumflected *proximad* of the two Condyles, distribute their branches through and under the two Vasti to the Rotular aspect, and form a part of the Vascular Plexus that is spread upon and round the Patella in the region of the Knee Joint. In forming this Plexus, they inosculate in their course with branches from the two Disto-Articulars, and the Azygos Articular ; the one turning round by the Tibial

side, with branches from the Anastomotic and with perforating branches from the Cruri-femoral Portion of the Crural ; and the other turning round by the Fibular side, with branches proceeding from the Smaller Circumflex.

DISTO-ARTICULARES,

or

Articulares Inferiores, Externa, et Interna.

THE two Inferior or Disto-Articulars, circumflected *laterad*, and nearer to the Joint and the Lateral Ligaments, unite more conspicuously in forming the Plexus with the recurrent branches from the Leg. In their course; they send branches to the Soleus, to the Popliteus, and the Gastrocnemius, to the Flexor Tendons, to the Capsular Ligament, the Lateral Ligaments, the Ligament of the Patella, and to the two Semilunar Cartilages ; and often inosculate on the parts more immediately connected with the Joint by very minute, though perceptible branches of the Azygos Articular.

ARTICULARIS AZYGOS,

or

Articularis Media.

This Azygos branch, arising from the Trunk, or from one of the two Proximo-Articulars, runs *distad*, and spreads, between the Condyles, on the Capsular Ligament, the adipose substance, the Semilunar Cartilages, and the Crucial Ligaments, inosculating with all the adjoining branches.

These five Articular Arteries are comparatively small, and most of their origins would be included within the limits of a large Aneurism, opposite to the Knee Joint, which is one reason, among many others of much more importance, why the operation for such an Aneurism should not be performed in the region of the Ham, and why the operation, or some other remedy, should be resorted to as early as possible, to preserve the articulation of the Knee Joint.

RAMI GASTROCNEMII.

Between the origins of the Proximal and Distal Articular branches, are regularly observed two branches entering the Heads of the Gastrocnemius,

and which not unfrequently send off a branch that, running superficially upon the muscle, often stretches as far as the Os Calcis.

ARTERIÆ TIBIALES.

THE two large branches of the Leg, are styled by Anatomists the Tibial Arteries. But instead of *Tibial*, I should have preferred the term *Cnemial*, a word not entirely a stranger in Anatomy, and which signifies in general what belongs to the *Κνήμη*, or Leg. Instead also of the vague terms *Anterior* and *Posterior*, by which these two branches are distinguished, and for which some of the older Anatomists make use of the terms *External* and *Internal* (*a*), I should have preferred the epithets *Rotular* and *Popliteal*. Both furnish blood to the fibular as well as to the tibial aspect of the leg, and therefore are not exclusively tibial. Besides, they run not either along the Tibia or Fibula; but in the space which is intermediate between the two, and if occasionally that which is styled *Tibialis Postica* happen to be nearer the

(a) The Anterior Tibial, according to HALLER, is the *Tibialis Exterior* of C BAUHIN, and the *Tibialis Postica*, the *Internal Tibial* of KEIL.

Fibula than Tibia, it loses the name *Tibialis Postica*, and assumes that of *Arteria Peronea*, and thus the principal artery of the leg, merely on account of changing its course a little to a side, is deprived of its name, and supposed to be wanting ; at the same time, when it thus inclines to the fibular aspect, it occasionally happens that its branch, styled *Tibialis Antica*, does not originate or make its appearance on the rotular aspect till the trunk be near to the middle of the Leg, or near to the place where the interosseous ligament terminates, in that case it loses the name *Tibialis Antica*, and is styled the *Peronea Antica*, and thus, like its trunk, is also in its turn said to be wanting. To such an absurdity are we reduced by designating Arteries from casual circumstances, and by varying their names with every slight or trifling variety observable either in their mode of origin, or their mode of distribution.

On comparing these Arteries with those which are termed *Radial* and *Ulnar*, the *Tibialis Antica* is that which corresponds, in its general character, to the *Radial Artery*, and the *Tibialis Postica* to the *Ulnar*. As the *Radial Artery* recedes from the Thenar aspect of the arm, to run on the Anconal aspect of the Carpus, and returns again to its former

aspect between the Metacarpal bones of the Thumb and the *Index Manus*; so the *Tibialis Antica* of the Leg leaves the Popliteal for the Rotular aspect, runs along the bones of the Tarsus, and returns again to its former aspect between the Metatarsal of the Great Toe, and of what may be called the *Index Pedis*.

As the Ulnar Artery always continues on the same aspect, and is very generally the principal Artery that furnishes the Volar and Digital branches, so the *Tibialis Postica* of the Leg always continues on the same aspect, and is in general the principal Artery that furnishes the Plantar and Digital branches. This *Tibialis* frequently sends off a considerable branch which runs along the side of the Fibula as far as the Tarsus, and sometimes so large as to pass for the Trunk, when the Trunk is either said to be wanting, or only a branch of the Peroneal or Fibular Artery (*b*). The young Anatomist is here to recollect, that the Fibula is that bone of the Leg which corresponds to the Ulna of the fore-arm (*c*), and that

(*b*) See last page.

(*c*) The Radius, situated on the same side of the Hand with the Thumb, must correspond to the Bone of the Leg on the same aspect with the Great Toe. But besides this, there are many other proofs of analogy, of which I shall mention only one or two. On viewing the extremities of the lower animals, we soon perceive that the Radius and Tibia have a more regular and permanent character than the Ulna and Fibula. The

the *Tibialis Postica*, by running a little nearer to the *Fibula*, approaches in its character still nearer to the *Ulnar*.

The occasional branch called *Peronea*, that runs *distad* by the side of the *Fibula* as far as the *Tarsus*, arising sometimes from the *Tibialis*, that corresponds with the *Radial Artery*, though more frequently from the *Tibialis*, that corresponds with the *Ulnar Artery*, has evidently many of those characters which belong to the *Interosseal* of the fore-arm. The *Interosseal* sometimes arising from the *Humeral Artery* along with the *Radial*, but more frequently from the *Humeral Artery* along with the *Ulnar*, always sends off perforating branches through the *Interosseous Ligament*; generally distributes its ultimate branches in the region of the *Carpus*; occasionally assumes the size of the *Radial* and *Ulnar Arteries*, and sends off *Volar* and *digital* branches, which are all characters, making allowance for difference of circumstance, belonging to this *Artery* of the *Leg*.

two last are respectively larger in *Moles* and in *Frogs*; respectively smaller in the *Cow* and the *Horse*: while the *Fibula* is wanting in the *Deer* and the *Goat*, and the *Ulna*, if united by ossification, only a kind of process to the *Radius*, as the *Fibula*, when present, is in many species nothing more than a process of the *Tibia*.

TIBIALIS ANTICA,

OR

Cnemi-rotularis,

Is properly a branch of the Cnemi-popliteal, or Posterior tibial, it passes in general from the Popliteal to the Rotular aspect, at the *Distal* margin of the Popliteus (*d*), when it runs *distad* along the Ligament; at first, between the Extensor Digitorum and Extensor Pollicis, and then between the Extensor Pollicis and Tibialis Anticus. Approaching the Distal extremity of the Tibia, it runs *distad* and *tibiad* towards the Tarsus. Arriving at the Tarsus, it passes under the Ligament of the Tendons, and continues its direction towards the Interstice between the Metatarsals of the Great Toe and the Index Pedis. Between these, it runs *distad* and *plantad*, and at last, terminating on the Plantar aspect, inosculates with a branch of the Cnemi-popliteal, called *Plantaris Externus*.

Before it passes to the Rotular aspect, it distributes branches to the Soleus, Tibialis Posticus, and

(*d*) “ Par-dessus l’extrémité supérieure du Ligament Inter-
 “ osseux dans l’espace d’échancrure qu’on y observe, et non par
 “ un trou, comme quelques Anatomistes disent.”—*Portal*.

the Capsular Ligament, on which last, they inosculate with the Azygos Articular, and the Disto-Articulars. Immediately on arriving at the Rotular aspect, it sends off a branch that is named the *Recurrent*, ascending between the Extensor Digitorum and Tibialis Anticus, distributing Ramuli to these muscles, to the parts around the head of the Fibula, uniting also with the Disto-Articularis, and entering the Vascular Plexus of the Knee Joint.

A little farther advanced in its progress, it is frequently seen giving out another of considerable size, which, penetrating through the Extensor Digitorum, runs *distad* on the Fibula between the Extensor and Peroneous Longus, as far as the Ankle. It is also observed, through the whole of its course, sending off branches in great numbers, at small distances, and at nearly right angles towards the Tibial and Fibular Aspects, to communicate with branches from the Cnemi-popliteal; from these chiefly originate the numerous and nameless ramuli which are distributed upon the adjacent muscles and integuments, or which perforate the interosseous ligament.

The same mode of general distribution is continued throughout; for whether it be on the Leg or

Foot, it every where inosculates, through the medium of its branches, with branches that pass through Interosseous spaces, and, upon the *Tibial* and *Fibular* aspects, with branches that originate in the Cnemio-pliteal, or Posterior-tibial. Murray calls two of these lateral branches the *Malleolares*, because they are ramified upon the Ancles. Haller calls another the *Arteria Tarsea*, which runs *fibulad* under the Extensors across the *Tarsus*; and another the *Arteria Metatarsea*, from its running *fibulad* on the Proximal extremity of the *Metatarsus*. These last branches, meeting with some of the Plantar branches at the Fibular aspect, are converted into what Anatomists call Arches. From the convexity of these arches, branches run *distad* along the Interossei. But these arches can scarcely be reckoned regular appearances; in some individuals, they are very indistinct, and in others, the eye, though assisted by the fancy, cannot discern them. When both are present, the one is generally larger than the other, or if it be more than usually large, the other is wanting. The functions of both them and their branches are often performed by branches proceeding directly from the Trunk to the Interossei; sometimes again by a Vascular Plexus formed by numerous branches

from the Trunk, and by branches from the Plantar aspect of the Foot, penetrating through Interosseous spaces, or inosculating on the Tibial and Fibular aspects. I have one preparation minutely injected, where large branches are seen running along the Interossei, and which, as is evident from the injection, had received a supply of blood from the Plexus, and the principal share from the perforating branches of the plantar aspect.

Before this Cnemi-rotular branch enters the *Planta*, between the Metatarsals of the Great Toe and the Index Pedis, like the Radial Artery, when passing to the Vola between the Metacarpal bones of the Thumb and the Index Manus, it sends off a branch which afterwards divides into a Digito-Fibular of the Great Toe, and a Digito-Tibial branch of the Index.

“ In many subjects,” says Mr. Burns in a letter, “ I find the Anterior Tibial exhausted before it reaches the Tarsus.” In one case, I perceived it obliterated at the Distal extremity of the Tibia and Fibula, but appearing as usual upon the Tarsus, with several of the lateral branches enlarged. It is not improbable that pressure from the shoe, or from other causes, may frequently impede the functions of this Artery and of its branches, where they

run upon the Tarsus, and occasion appearances that did not belong to the original and natural formation.

In the letter to which I have just now alluded, Mr. Burns adds, " In two subjects I found the Anterior Tibial wanting. Its place was supplied by perforating twigs from the Posterior Tibial Artery. The Arteria Peronea Antica supplied its place on the Dorsum of the Foot (*c*)."

In leaving the Popliteal for the Rotular aspect, this Tibial or Cnemi-rotular Artery does not always pass at the Distal margin of the Popliteus. In the fifth plate of the fifth Fasciculus of Haller, the Tibialis Postica or Cnemi-popliteal, the larger division of the Cnemial Portion of the Crural Artery runs *distad* a considerable way on the Popliteal aspect of the Leg, and then divides into two branches of very nearly an equal magnitude; one continuing the course of the Trunk on the same aspect, along the Fibula; the other perforating the Interosseal Ligament, to assume the place and perform the office of the Cnemi-rotular, or Tibialis Antica. If the common Trunk in this case were to be viewed as the proper Trunk of the Peroneal Artery, the Tibialis Antica might

(*c*) See page 260.

be said to be wanting (*f*), and its place supplied by a perforating branch from the Peroneal, distinct, however, from the perforating branch that passes through the Ligament near its Distal extremity, and which by Haller has been honoured with the title *Peronea Antica*.

TIBIALIS POSTICA,

OR

CNEMI POPLITEA,

AFTER sending off the large branch already described under the name *Tibialis Antica*, or *Cnemi-Rotularis*, runs *distad* on the Leg, under the *Soleus*, adjacent to the course of the *Tibial Nerve*, and, at the sinuosity of the *Os Calcis*, generally divides into two branches denominated *Plantar*, distinguished by the epithets *External* and *Interndl*. In this course, and not far from its origin, it frequently sends off a large branch that extends to the *Tarsus*, and which, from its course along the side of the *Fibula* or *Peroné*, has been termed *Peroneal* (*g*).

(*f*) See page 257.

(*g*) “*Peronea*,” says Haller, “*Peronea plerumque minor, nonnunquam aut æqualis, aut potius major quam Tibialis*”

This *Peroneal* is at first concealed under the *Flexor Pollicis Longus*, sends off several perforating branches that pass through the Ligament to the Rotular aspect, and at last a branch, larger than the rest,

“Posterior, aliquando nulla fuit, ut ejus loco ramus esset ex
 “Tibiali Postica infra Popliteum ortus, descendens cum Flex-
 “ore communi Digitorum, et in ima ipsa epiphysi Tibiæ anas-
 “tamosin habens cum Trunco Arteriæ Tibialis.”—*Fascic. V. p. 37.* This language would seem to imply, that he did not consider the *Peroneal* so much a branch of the Posterior Tibial, as a separate Trunk from the Popliteal Portion of the Crural; and accordingly he observes in another place, “*Tibialis Postica* plerumque inter tres Truncos Arteriæ Popliteæ maxima est.”—*Fascic. V. p. 35.* If the *Peroneal* were a regular branch, and if it rose generally near the Distal margin of the Popliteus, it would render the analogy between the Arteries of the Leg and the Fore-arm still more striking. The Crural Artery might then, like the Brachial, be said to divide into three branches, the *Tibialis Antica*, *Tibialis Postica*, and the *Peronea*: the first corresponding to the Radial Artery, and generally the first branch of the three; the *Tibialis Postica* to the Ulnar Artery, and generally terminating the Crural Artery with the *Peronea*, that corresponds to the Interosseal branch of the Fore-arm. So far as I have been able to learn from my own observations, or from the observations of others, the Crural Artery, though like the Brachial exceedingly diversified in ramification, (Haller, *Fascic. V. p. 3, 4.*) is more steady as to the place where it sends off the Arteries of the Leg, than the Brachial Artery as to the place where it sends off the Arteries of the Fore arm. To form a judgment from the numerous observations already made, it must be seldom, and extremely seldom, that any of these three Arteries of the Leg take their

styled by Haller *Peronea Antica*, assisting the Anterior Tibial Artery in furnishing branches to the Ancles and Tarsus. The Peroneal, termed now *Peronea Postica*, continues its course behind the External or Fibular Ankle to the Os Calcis, whence some of its branches have been seen inosculating with that branch of the Tibial Artery called *Plantaris Externus*.

In those cases where this Cnemi-popliteal, in observing its more ordinary course, is impeded in its functions, it inclines towards the Fibular aspect, assumes the name as well as the direction of the branch which is distinguished by the epithet *Peroneal*; resigns entirely the title *Tibialis* to any branch that remains behind in its usual situation, or if there be no branch of the kind, the title *Tibialis* is suppressed for the time, and the Artery which enjoyed it declared to be wanting (*h*).

origin *proximal* of the Knee Joint, or run between its Capsular Ligament and the Popliteus; and perhaps one cause of this steadiness may be, that the voluntary motions of the Sacral Extremities are not so numerous, nor yet so varied as those of the Atlantal.

(*h*) "The Posterior Tibial is sometimes wanting, in which case the Peroneal is very large, and sends branches to the muscles which ought to be supplied by the Tibial; it also sends a large branch into the sole of the Foot; but I have in these cases found the Internal Plantar Artery wanting."—*Letter from Mr. Burns.*

When a Peroneal, and the two Tibial Arteries are present, the Peroneal, through the medium of its branches, inosculates with both; with the one *rotulad*, with the other *poplitead* of the Fibular Ankle; if it be large, inosculates also conspicuously with both upon the Fibular side of the Tarsus; with lateral branches from the Anterior or Cnemi-rotular; and with the External Plantar branch, that seems in general to be the continued Trunk of the Posterior or Cnemi-popliteal. Among these inosculating branches, one is particularly distinguished by its size, the regularity of its presence, and its steadiness of position; it is seen *poplitead*, near to the junction of the Tibia and Fibula, and extending transversely between the Peroneal and Posterior Tibial. Haller, who observed these inosculations, and trusted only to those that were conspicuous, remarks, that even in consequence of two, which he has mentioned, the Posterior Tibial might be tied without danger (*i*).

Amidst the great variety of branches which

(i) “ Illæ duæ anastomoses adeo magnæ sunt, ut nullum dubium supersit, posse Arteriam Tibialem, absque ullo periculo gangrænæ, ligari et destrui, ut solet cum radiali fieri. Aliæ etiam tamen sunt, neque eæ minimæ uniones inter hunc ramum *Peroneæ* et posticam *Tibialem* ante Achillis tendinem, ut minores et reticulatas mittam, quæ retro eum tendinem, cum surculis Tibialibus coeunt, cuti propriores.”—*Fascic. V. p. 39.*

the Posterior Tibial gives out in the progress of its course to the parts adjacent, there is none so distinguished with respect to size, regularity of origin, or ramification, that has been thought entitled to a name, excepting this Peroneal, which is sometimes wanting, and the Nutritial Artery of the Bone, which is furnished occasionally by the neighbouring branches. If a Peroneal Artery be present, the Posterior Tibial unites with it often through the medium of the branches; if not present, the Tibial sends off other branches to supply the deficiency, communicates with the Anterior Tibial by perforating branches which pass through the Ligament, and by branches which ramify upon the Tibial and Fibular aspects. Having reached the Os Calcis, it distributes branches to the Sinuosity, and the parts around it; and, through the medium of these branches, inosculating with the other Arteries adjacent, it divides at last into the two branches that are termed *Plantar*.

RAMI PLANTARES.

THE Plantar branches are those which supply the sole of the Foot, and which run upon the Tibial and Fibular sides; the one running on the Tibial side, being the *Internal*; and the other on the Fibular

side, the *External*. The *External* is properly the Trunk continued ; the *Internal* has often more the appearance of a lateral branch, than of what might be called a division of the Trunk ; it is naturally wanting, when the *Tibialis Postica* is said to be wanting ; and even when the *Tibialis* is present, it has sometimes no other mark of distinction than that among the branches which issue from the Trunk, to be afterwards ramified on the Fibular side, it is generally the largest, and has its origin in the Sinuosity of the *Os Calcis*. The *External Plantar*, on the contrary, has been present when the *Tibialis Postica* has been said to be wanting ; an event which also naturally occurs when the blood, diverted from its usual channel in the region of the Leg, returns to it again by inosculating branches in the region of the Foot. Taking the two as they generally appear, they rise together in the Sinuosity of the *Os Calcis*, near the broad origin of the *Abductor Pollicis Pedis*, or the articulation of the *Os Calcis* with the *Astragalus*.

The *Ramus Internus*, or the *Arteria Plantaris Interna*, as it sometimes is called, is seen running *distad* upon the Tibial side of the *Planta*, and the Central aspect of the *Abductor Pollicis Pedis* ; distributing branches to that muscle, to the *Flexor Bre-*

vis, the Adductor Pollicis, and the parts adjacent, whether they be Bones, Ligaments, Tendons, or neighbouring Integuments. It inosculates upon the Tibial aspect with numerous branches from the Rotular aspect; towards the Fibular side of the Planta, with branches from the *External Plantar*; with Retrograde branches of the same *Plantar* proceeding from its Arch; and with the Tibialis Antica, where it enters the Planta, and anastomoses with the *Ramus Externus*.

Ramus Externus, or the *Arteria Plantaris Externa*, continuing the Trunk, runs *distad* and *fibulad*, and *centrad* of the Flexor Brevis Digitorum, until it reaches the Proximal extremity of the Metatarsal of the Little Toe; from that situation, or a little beyond it, it bends *centrad* of the Flexor Tendons to the Tibial side, until it arrives at the Interstice between the Metatarsals of the Great Toe and the Index Pedis. At that point, it meets and inosculates with the Tibialis Antica, and completes what is called the Plantar Arch (*k*). This is the only Arch of

(*k*) Verheyen, the first who observed and described the Deep Volar Arch, was the first also who bestowed the name of *Arch* on this part of the *External Plantar*. “Hunc arcum primus dixit Philippus Verheyenius et inter ramum *Plantaris* internum atque Tibialem Anticam, rete intercepi recte observavit.”—Haller, *Fascic. V. p. 50*.

the Planta, and, though seemingly (*l*) formed by the Tibial Artery, or Cnemi-popliteal, which corresponds to the Ulnar of the Fore-arm, it is not superficial, but deeply seated, and in that respect rather resembles the Deep Volar Arch, which is principally formed by the Radial Artery; and which, in cases uncommonly rare, sends off the Volar and Digital branches.

During its course *distad* and *fibulad*, the External Plantar sends branches *peripherad* to the Incumbent Integuments and muscles; branches towards the Fibular aspect, where they meet with others from the Rotular aspect; branches *tibiad* to inosculate with the Plantaris Interna, or if the Plantaris Interna be wanting, continued till they meet with other branches near the Tibial aspect.

(*l*). It is a matter of little importance, whether this Arch be assigned principally to the Anterior Tibial Artery, or the Plantar branch of the Posterior. It is formed by both, and, like the Deep Volar in the hand, formed by the Radial and a communicating branch from the Ulnar, may at times receive a greater supply from the one than the other. “ Ut difficile dictu sit,” to use the language of the learned Haller, “ Ut difficile dictu sit “ an ad hanc omnino Plantarem Externam arcus Plantaris pertineat, et tamen jura *Anticæ Tibialis* potiora sint, quæ diametro Plantarum superet, et cujus truncus ita dirigatur, ut rami arcus Plantaris, angulos eum ipso obtusos, eum Plantari Externa acutos faciant atque adeo etiam hoc ex principio potius “ ad Tibialem Anticam spectent.”—*Fascic. V. p. 50.*

In its course from the Fibular to the Tibial side, where it forms the Arch, it gives off the several Plantar branches that are either continued, or afterwards divided into Digital branches. The Digitals run *distad* on the Tibial and Fibular aspects of the Toes, inosculate in their course by Transverse branches, and, like the Digital branches of the hand, terminate at last in Digital Arches.

Near the Metatarsal of the Great Toe, where it unites with the Anterior Tibial Artery, it increases its diameter, and generally sends off the Plantar branch which afterwards divides into the Digito-Tibial of the Index Pedis, and the Digito-Fibular of the Great Toe. With respect to the Digito-Tibial branch of the Great Toe, it is sometimes wanting; has sometimes its place supplied by a Plexus; at times is a branch of the Anterior Tibial Artery before the anastomosis is formed; and at times a division of the Plantar branch, from which the other two Digitals arise. The other branches from the Plantar Arch, are those which correspond in their general character to what Haller has denominated, in treating of the Hand, *Volar Interosseals*, *Volar Perforants*, and *Retrograde Volars*. And here terminate the Ramifications of the AORTA.

ARTERIA PULMONALIS,

THE *Arteria Venalis* of Realdus Columbus, and the *Vena Arteriosa* of a great number of the older Anatomists prior to Harvey. It rises from the Right, or Pulmonic Ventricle, and ascends from its origin *atlantad* and *sinistrad*, until it arrives at the concave part of the Left Pillar of the Aorta, where it divides into two branches (*m*), one on each side of the Aorta,

(*m*) In the Fœtus, it divides into three : the third branch entering the Aorta, and named the *Ductus Arteriosus*. From the collapsed state of the Lungs previous to birth, they cannot receive the whole of the blood that enters the Right, or Pulmonic Ventricle, and hence probably one of the reasons for the third branch during that period. If the Left, or Systemic Auricle of the Fœtus, were only to receive the portion of blood that flows through the Lungs, it would only receive a small quantity, compared to what must necessarily flow in the same time into the Right, or Pulmonic Auricle ; and if the Left did not contract until it was filled, the Right, or Pulmonic Auricle and Ventricle would necessarily contract oftener than the Left. To prevent this effect, the Septum, interposed between the two Auricles, is imperfect in the Fœtus, and the blood flows from the Right to the Left through a passage called the *Foramen Ovale*. By this contrivance, the Right Auricle cannot be distended

the Right to be ramified on the Right Lobes, and the Left on the Left Lobes of the Lungs.

This Artery, like the Aorta, is at its commencement furnished with three Semilunar Valves, to prevent the return of its blood to the Ventricle. As the whole of the blood, which circulates through the Left, or Systemic Ventricle and the Aorta, circulates likewise through the Right Ventricle and Pulmonic Artery, it might naturally be supposed that the two

sooner than the Left ; whence they must contract at the same time, and if the two be of equal capacities, must convey equal quantities of blood to their respective Ventricles. The two Ventricles, contracting together after the Auricles, must also, if they be of equal capacities, convey equal quantities of blood in the same time to their respective Arteries. Or supposing neither the Auricles nor Ventricles of the same capacities, but their actions synchronous, the Auricle with Auricle, and the Ventricle with Ventricle, contracting together, as we know is the case, in the healthy and regular motions of the system ; the Pulmonic Ventricle would then discharge a greater quantity of blood into the Lungs, than the Systemic, or Left Ventricle, in the same time could discharge into the system at large, or discharge a less quantity of blood into the Lungs, than would be sufficient to support the action of the Systemic Ventricle and Artery ; in either case, the blood would accumulate in the Veins, the Auricle, the Ventricle, or in the Artery that returns it to the Lungs, —an event which not unfrequently happens in the last moments previous to death, when the wonted force of the Heart is diminished, and the wonted resistance of the Lungs is increased from the languid and imperfect state of respiration.

Ventricles, and the two Arteries, compared respectively, would be very nearly of equal capacities. Many, however, on comparing these organs, have found that the Right Auricle and Ventricle were larger than the left; and Helvetius saw that the branches of the Artery, ramified on the Lungs, were larger than the concomitant Veins. A number of learned and ingenious theories had been invented to explain these phenomena, until accurate experiment and observation showed that they originated from causes accidental, from accumulations of blood, in the greatest number of natural deaths, preventing the Pulmonic Auricle and Ventricle, and the branches of the Pulmonic Artery from contracting so much as they could have contracted, had they been able to have emptied themselves into the vessels of the opposite side(*n*). The conclusion is confirmed by what is frequently the state of the Colon; if completely emptied previous to death, and the other Intestines found to retain their usual diameter, it is sometimes found the smallest of the whole. If the Aorta, near its commencement, and emptied of its blood, be still found larger than the Pulmonary Artery, it must occur to the Surgeon and Anatomist, from the fre-

(*n*) Sabatier. *Memoire première. Traité Complet. D'Anatomie, tom. iv.*

quency of Aneurism in the Arch of the Aorta, that the Aorta in that situation is liable to enlargements, though they cannot be strictly called Aneurismal.

Mayow, who believed that the Lungs were intended to convey Oxygen, or what he called the Nitrum Aereum, into the blood to supply and diffuse the animal spirits, and to support muscular motion (*o*), was doubtful whether the action of the

(*o*) “ Vita, ni fallor in spirituum animalium distributione
“ consistit; quibus supplendis, cordis pulsatione, sanguisque
“ ad cerebrum affluxu opus est: et videtur respirationem ad cor-
“ dis motum, modo alibi dicendo, præcipue conducere. Enim
“ vero verisimile est, ad quemvis musculorum motum sal hoc
“ æreum omnino necessarium esse; ita ut sine eodem neque
“ cordis pulsatio fieri possit.

“ Plane ut præcipuus respirationis usus esse videatur, ut
“ musculorum et præcipue cordis motus institatur. *Tract.*
“ *Secund. de Respirat. p.* 266, 268. Addo insuper quod parti-
“ culæ nitro acree non minus quam ipsi spiritus animales ad vi-
“ tam sustinendam necessariae sunt. *Tract. iv. cap. iv. p.* 321.
“ Circa spirituum animalium indolem arbitrari liceat, eos saltem
“ quatenus iidem ad motum animale conducent e spiritu nitro-
“ aereo constare.”—*Ibid, p.* 311.

Mayow, having persuaded himself that his Nitro-Aerial particles, by mixing with the blood, were the primary cause of irritability and muscular motion, next tried to explain how these motions, by causing agitation, collision, friction, and effervescence between the Nitro-Aerial particles and certain Salino-Sulphuric particles, produced likewise animal heat. His notion, however, respecting the manner in which the Nitrum Aereum operated, or was operated upon in the generation of

Lungs should be deemed essential in promoting the circulation of the blood. He clearly proved,

animal temperature, was never at any time generally received. His other notion, that respiration was principally intended for transmitting Oxygen or the Nitrum Aerum into the system, has not only been general, but prevalent till lately; and hence the irritability of the muscular fibre, the processes of vitality, and consequently all the functions of the system, have for a while been made to depend upon the Oxidation, the Arterialization, or Oxygenation of the Sanguineous Fluid. Again, it would appear, from the numerous experiments of Mr. Ellis, that respiration contributes to support animal temperature, not by furnishing additional Oxygen, but by removing the excess of Carbon.

Hippocrates and Galen, who supposed the existence of an *ἐμφυτον Πῦρ*, or *Calor Nativus* residing in the heart, imagined that respiration was intended to supply it regularly with fresh and cool air to give it ventilation, and remove from around it the fuliginous vapours, with which it might otherwise have been extinguished. The learned Laurentius, who agrees here with Hippocrates and Galen, that the primary intention of respiration is to preserve the *Calor Nativus*, “Est itaque primus, hic respirationis usus. Conservatio caloris cordis, quæ fit refrigeratione et expurgatione,” (*Lib. ix. Quest. xxix. Hist. Anat.*) is also of opinion, that respiration rather takes from the blood than gives any thing to it, and accordingly observes, that the expiration is more essential than the inspiration: “Respondeo inspirationem rare ut expirent. Adest necessitas expirationis ob copiam fuliginis non inspirationis.”—*Ibid.*

Cicero, who did not think of applying his notion of heat to illustrate the nature of animal temperature, had an idea that the motions of the blood in the Veins and Arteries, and the palpitation of the heart of an animal, when out of the body, were owing to the vital power of the heat. *Lib. ii. Cap. ix. De Natura Deorum*; and, what is singular, believed that the air naturally,

that it was not necessary in promoting that function in the Incubated Ovum, or Fœtus in Utero, and seemed willing to infer, that it was not necessary to that function in the Adult (*p*). According to him, the Placenta of the Fœtus, is a Pulmo Uterinus (*q*) for supplying the blood with these Nitro-Aerial particles, and when the Umbilical Cord is compressed before the respiration commences, the child dies from a want of air, not from the stoppage of the circulation. For why, he argues, should this compression stop the circulation, if the blood may flow as freely as before through the Ductus Arteriosus and Foramen Ovale? To such an objection, he who is merely an observer of nature, has only to answer that it does not: He who

among the coldest of bodies, contained a very considerable quantity of it in a latent state. “Ipse vero aer, qui natura est “maxime frigidus, minime est expers Caloris; ille vero et multo “to quidem calore admistus est.”—*Ibid. cap. x.* Cicero, from the general train of his reasoning, was led to imagine what Dr. Black afterwards demonstrated.

(*p*) “Imo sanguis etiam per ipsos Pulmones sine respiratione “is ope transire potest, ut alibi a nobis ostensum est.”—*Tract. iii. prope initium.* “Quinimo sanguinem per Pulmones a motu “tu cessantes, transire posse alibi ostensum est.”—*Tract. iv. Cap. iv.*

(*q*) “Proinde ut Pulmonem non amplius Jecur sed potius “Pulmonem Uterinum, nuncupandum esse arbitror.”—*Tract. iii. p. 279. Edit. Hagæ-Comitum.*

conducts the operations of nature, can best reply to the question, why?

But admitting, with Mayow, that the primary and essential use of the Lungs is to transmit the Nitrum Aereum into the system, yet in those cases where the whole of the blood is circulated through them, it does not follow, that because the motions of inspiration and of expiration are at longer intervals than the Diastole and Systole of the Heart, that they therefore are not necessary to the circulation. Admitting, even on the older hypothesis of respiration, that it rather takes from, than gives to the blood, and that the Placenta is equally capable of officiating as Lungs in the one capacity, as well as in the other, still it must be allowed, that not only the Placenta, but Umbilical Cord have also a different function to perform. They are the vehicles by which nourishment is partly prepared and conveyed to the Fœtus. Previous to birth, the Uterus is employed to furnish that nourishment; but after birth, in the class of Mammalia, the Mammæ are made to succeed to the office, while the organs of digestion, and the Lacteal Absorbents, are made to succeed the Placenta and the Cord in preparing and conveying it to the Vascular System. This last office of the Placenta scarcely accords with any of the functions ascribed to the Lungs.

The animal processes, in different genera and species of animals, require different degrees of temperature, and therefore, if their internal temperature be raised or lowered, beyond a certain limited range, they sicken or die. Many species have the power of preserving their internal temperature, amidst wide diversities of external temperature; those who have not, become torpid in the colder seasons, or are restricted to regions and climates, where the diversities of external temperature are more confined. Plants that have little of internal heat, if they inhabit the same latitudes, and require different degrees of temperature, are compelled to live at different altitudes from the level of the sea.

Some species of animals have proportionally larger, and some proportionally smaller Lungs of the same kind of structure. Some classes of animals have the whole of their blood circulated through the Pulmonary vessels; and some classes only a part of it. Where the Lungs are large in proportion to the body, where the whole blood is circulated through them, or circulated rapidly, the temperature in general is high; where only a portion of the blood passes through them, where they are small, or the blood circulated with a less velocity, the temperature in general is proportionally low.

Whether Carbon be discharged, or Oxygen re-

ceived, one of the intentions of respiration evidently is to preserve the blood, or the circulating fluid, in that state which fits it for entering into those processes in which heat is evolved, and the internal temperature supported.

Without temperature, internal or external, no process in either the formation, or the preservation of animal or vegetable; has been ever carried on. Plants and animals are not reduced to the torpid state in the end of Autumn from deficiency of Oxygen, or excess of Carbon, but from want of temperature. Nor are they revived again in Spring from any additional supply of Oxygen, or discharge of Carbon, but an increase of temperature. A requisite temperature must precede every process in which heat is either evolved or absorbed; and if the processes, in which it is evolved, appear in their turn supporting the temperature, it is like the offspring supporting the parent, or like the offspring which, first being generated, generates in its turn. In short, it may be said, translating almost the language of Cicero, that every thing which lives, whether plant or animal, lives by the vital agency of heat (*r*).

(*r*) “ Omne quod vivit, sive animal, sive terra editum, id vivit
“ propter inclusum in eo Calorem. Ex quo intelligi debet, eam
“ Caloris naturam vim habere in se vitalem, per omnem mun-
“ dum pertinentum.”—*De Natura Deorum, Lib. ii. Cap. ix.*

Animals that require a determinate range of animal temperature, must, while in health, evolve less Caloric, when they are surrounded by a higher temperature, and more Caloric, when they are surrounded by a lower temperature, than that of the vital standard within them.

The Fœtus in Utero is constantly surrounded by a temperature as high as that of the parent. To preserve, therefore, its natural range of animal temperature, it must necessarily after birth, when it is surrounded by a lower temperature, evolve a greater quantity of Caloric. This may in some measure explain, why, previous to birth, much of the blood that flows in the Aorta returns to the Aorta through the Ductus Arteriosus and Foramen Ovale (*s*), without circulating either through the Lungs or the Placenta ;

In another place, Cicero characterizes the heat of the fire, or external heat, and the *Calor Inclusus*, or internal heat, in the following manner : “ Hic noster ignis, quem usus vitæ requirit, “ confector est et consumptor omnium, idcirco, quocunque “ invasit, cuncta disturbat ac dissipat. Contra ille corporeus, “ vitalis et salutaris, omnia conservat, alit, auget, sustinet, “ sensusque afficit.”—*Ibid. Cap. xv.*

(*s*) The Foramen Ovale is frequently found partially open even at a late period of life ; and in a female arrived at maturity, and whose Heart and Thorax I demonstrated in my Class, it remained almost entirely open, yet the Lungs quite sound, the appearance not bloated, nor the muscles more flaccid than usual. After every inquiry, I am still ignorant of the symptoms with which this structure was attended.

and why, after birth, the whole begins to be circulated through the Lungs, and that quantity of Caloric regularly evolved, which is necessary to support the vital heat amidst a surrounding temperature, that is lower than that to which it had previously been accustomed.

Where the Foramen continues open in the adult, the Lungs are deprived of their usual proportion of circulating fluid. The Continuator of Bichât mentions a case where they had more than their usual proportion : A large branch from the Abdominal part of the Aorta, ascended in the Thorax, divided into two, and supplied the Inferior Lobes of the Lungs upon each side.

“ Je ne dois point omettre ici un phénomène anatomique fort singulier observé depuis peu. Sur le corps d’un enfant de sept ans, on trouva une Artère très-volumineuse qui, née de l’Aorte Abdominale au niveau de la Cœliaque, se recourboit supérieurement, pénétrait dans le Thorax par l’ouverture Œsophagienne du Diaphragme, et se divisoit aussitôt derrière l’Œsophage en deux grosses branches qui s’enfonçoient dans les poumons par la partie inférieure et postérieure de leur face interne, pour se distribuer de l’un et de l’autre côté à tout le lobe inférieur. Ces branches s’anastomosoient sensiblement par plusieurs rameaux avec l’Artère Pulmonaire Supérieure, comme on s’en assura en injectant celle-ci. Les Veines Pulmonaires étoient disposées à la manière ordinaire et se distribuient également à toute l’étendue des poumons, quoique les lobes inférieurs ne reçussent de vaisseaux artériels que la de Pulmonaire Abdominale et que l’Artère Pulmonaire Supérieure ne se distribuât qu’aux lobes supérieurs. Cette observation très-curieuse, dont aucun Anatomiste n’avoit cité d’exemple, est due au Cit. Maugars d’Angers.”

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